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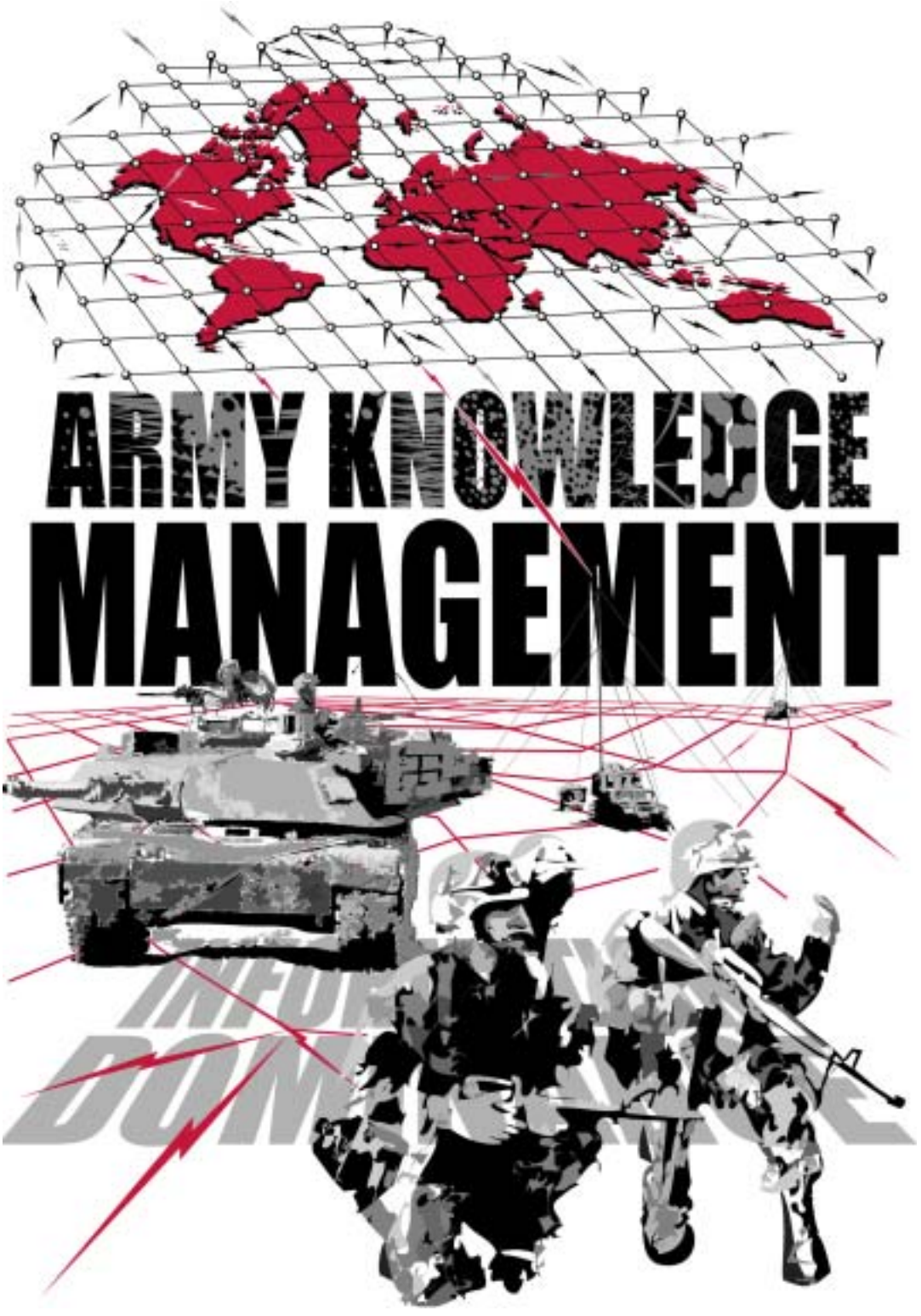

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Army Knowledge Management and the Army's transformation

The Army's transformation is taking us down a road of cultural change that will revolutionize the way we acquire and employ our information-technology assets. These cultural changes will forever alter how we conduct daily business and operations in the Army. To remain relevant to Army transformation and the objective force, Signal soldiers and leaders must begin to adapt and immerse themselves in this new culture.

This culture change is manifested in the Army chief information officer's Army Knowledge Management initiative. AKM is the Army strategy to transform itself into a network-centric, knowledge-based force. This will enhance decision dominance both on the battlefield and in day-to-day operations. This requires us to change our cultural thinking away from the "islands of automation" mentality to the enterprise management of IT resources. This means that organizational IT investments must support the Army's enterprise-wide goals under AKM. To better understand these concepts, look at the Army CIO's briefing at https://www.us.army.mil/akm.html.

Establishing Army Knowledge Online as the Army's enterprise portal is one of AKM's goals. Why is this important to Signal leaders and soldiers? AKO is an integral part of that cultural change I just talked about. You must embrace AKO and become an active participant to stay abreast of changes and fully reap the potential benefits. Universal access to information, collaboration capabilities, knowledge centers, virtual teams and projects and enterprise memory will all be managed and accessed through AKO.

MG John P. Cavanaugh
Chief of Signal

If AKO is viewed as the enabler of AKM, I see the Signal Regiment as the enabler of AKO. Our officers, warrant officers, soldiers and civilians are the driving force behind the AKO vision to transform the institutional Army into "an information-age, networked organization that leverages its intellectual capital to better organize, train, equip and maintain a strategic land combat force." The personnel currently working AKM and AKO are mostly Signal Branch or Functional Area 24 or 53 officers with IT expertise. It's important that all members of the Signal Regiment are aware of this because these are the types of cutting-edge job skills we'll need to master as we transform to the objective force.

The future of AKO holds much promise and opportunity for the Regiment. Many of the Army's current processes will be automated and accessed through AKO, right from your desktop, regardless of where you're located. Pay, personnel management, records review, medical and dental appointments, applications, search functions and all knowledge centers will be available through AKO. Instant messaging and personally tailored news channels will make communication, coordination and collaboration throughout the Army easier and more efficient.

The Army's secretary and chief of staff required all soldiers and civilians to have an AKO account by Oct. 1, 2001. Ultimately AKO's utility will increase dramatically as everyone embraces AKO as their primary tool for knowledge management. Signal leaders should ensure all their soldiers and civilians are registered and logging on. Officers, noncommissioned officers, soldiers and civilians should have their own accounts, explore the AKO site and get familiar with its expansive list of features. Personalize your own homepage and check out the various knowledge centers that are accessible from AKO.

Finally, spread the word and help ensure the units and organizations you support are an active part of the Army's transformation. The Signal Regiment will spearhead the Army's IT transformation and, as always, we must embrace the challenge.

If AKO is viewed as the enabler of AKM, I see the Signal Regiment as the enabler of AKO. Our officers, warrant officers, soldiers and civilians are the driving force behind the AKO vision to transform the institutional Army. ...

U.S. ARMY SIGNAL CENTER AND FORT GORDON

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Voice of the Signal Regiment

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Army Knowledge Management:

the Army's information revolution

by Miriam Browning

"The Revolution was effected before the war commenced. The Revolution was in the minds and hearts of the people … this radical change in the principles, opinions, sentiment and affections of the people was the real American Revolution."

— John Adams, 1818
U.S. President, 1797-1801

In the early 19th century, President John Adams correctly assessed the will of the American people calling for change. While not as dramatic as the American Revolution, Army Knowledge Management nevertheless is a pioneering, strategic concept to transform the Army into a network-centric, knowledge-based force. AKM is the information revolution for the Army in the 21st century.

AKM has its conceptual roots in Army transformation, the global e-business model and the imperatives of electronic government. The germinating seed for AKM has been Army Knowledge On-line, the Army's enterprise portal and gateway for information access. During the past year, AKM has been a change catalyst not only for the Army's information-technology world but also for the functional and major command communities that use IT's enabling power. A summary of AKM follows.

A dynamic concept

AKM strategy is the center of the Army's information revolution. It's the enabler for mission operations, knowledge generation, information delivery and technology innovation.

The AKM vision encompasses a transformed Army, with agile capabilities and adaptive processes, powered by world-class, network-centric access to knowledge systems and services, interoperable with the joint environment. It embraces Army and Defense Department imperatives for information dominance, and integrates technology, e-business and knowledge-management concepts.

The AKM framework consists of three interrelated components: intellectual capital, infostructure and change catalysts. *Intellectual capital* is the expertise, experience and insights that reside in the workforce – military, civilian and industry partners – coupled with new strategies for harnessing human capital. *Infostructure* is the hardware, software and communications information technologies and associated architectures and facilities that ensure universal access, security, privacy and reliability of Army and DoD networks. The *change catalysts* are the innovative policies, governance structures and culture changes that create a network-centric environment and a knowledge-based workforce.

The AKM strategic plan, endorsed by both the Army's secretary and chief of staff in August 2001, delineates five goals:

- Adopt governance and cultural changes to become a knowledge-based organization;
- Integrate KM concepts and best-business practices into Army processes to improve performance;
- Manage the infostructure as an enterprise to enhance capabilities and efficiencies;
- Scale AKO as the enterprise portal to provide universal, secure access for the entire Army; and
- Harness human capital for the knowledge organization.

As a strategic concept, AKM will continuously incorporate change. The AKM vision, framework and strategic-plan goals are constant guideposts, while the specific objectives associated with each goal will change as actions are completed and new initiatives are started.

Army transformation link

AKM is not your typical KM program. Its sweeping scope makes it a strategic transformer for managing information and IT at the enterprise level. Contrast this strategic focus with a traditional KM program that focuses on information sharing, the acknowledgment of tacit as well as explicit information, and processing. A classic definition of KM is the process of organizing, accessing, improving, sharing and benchmarking explicit and tacit information for mission results.

In many organizations, communities of interest evolve to share information to get the job done better. For example, in the late 1990s, the Army established many of these grass-roots level communities such as medical, personnel, acquisition and command, control, communications and computers. They developed websites and used collaborative tools to access, organize and share knowledge.

Communities of interest are incapable of surviving unless they are an integral part of the larger environment that sustains them. Thus, AKM was created as a strategic concept linked to Army transformation. AKM goals and objectives

are integrated into the Army Transformation Campaign Plan. In addition, functional areas and MACOMs have integrated AKM concepts into their own transformation plans. The link between AKM and Army-transformation plans has brought energy and synchronized results across a broad spectrum of Army operations.

Participatory governance

Two critical governance aspects of AKM are the chartering of the Army Chief Information Officer Executive Board and the establishment of strategic partnering between the Army CIO and the Army's functional and MACOM communities. Both of these governance mechanisms require strong, committed participation from all stakeholders.

The Army CIO Executive Board, composed of the CIOs from the MACOMs and a Senior Executive Service or general officer from each Headquarters Department of the Army staff agency, functions as a proactive decision body for all AKM matters. The board, chartered in April 2001, meets quarterly and is actively engaged in AKM policy, governance and investment decisions through working-level groups and virtual communication channels. A separate, access-protected website has been established for executive-board members and their action officers. Draft guidance and policies are coordinated through the website. Even though response times may be aggressive and at times the tasks are difficult, the basic philosophy is one of inclusion and collaboration to get the job done well.

Strategic partnering is customer outreach between the Army CIO community and the Army functionals and MACOMs. Fundamental to the success of strategic partnering is the idea that the Army CIO, as lead AKM change agent, can be counted on to assist Army communities with information and IT initiatives – ensuring a link to AKM and providing advice and counsel on a wide range of related issues. Similarly, Army functional and MACOM communities can improve the CIO's effectiveness by including CIO community members and providing them with more in-depth knowledge of their areas.

AKM framework: the knowledge-based organization

- **Intellectual capital** – individual, team and enterprise knowledge, systems, services and workforce strategies that are necessary to improve operations and decision-making;
- **Infostructure** – the IT (computers, software, architecture, security, communications, programs and facilities) required to support the network-centric Army; and
- **Change catalysts** – the policies, resources, management, culture, processes and education required to optimize an adaptive organization and enterprise network-centric environment.

The Army CIO has initiated a formal program called the Functional Exchange Officer Program. The immediate purpose of the FEO Program is for the CIO, functional and MACOM communities to work together to streamline and expedite the placement of applications on AKO by July. The long-term benefits of the FEO Program are to enhance customer relations between the CIO community and the rest of the Army and ensure that Army-transformation strategies are synchronized.

AKM guidance memo

The AKM guidance memo dated Aug. 8, 2001, signed by both the Army's secretary and chief of staff, designates the Army CIO as the change leader across a broad spectrum of Army initiatives, many of which are outlined in the memo:

- A fundamental change in the IT world to the enterprise (vs. MACOM or functional) management of systems, networks, and information access;
- The centralization of IT dollars for Army CIO oversight and prioritization;
- The designation of AKO as the Army's enterprise portal and gateway for information access; and
- The enterprise consolidation of the Army infostructure.

The memo includes the capturing of best-business and KM practices in the Army for collaborative use across the organization and the identification of innovative ideas and initiatives for reshaping to a knowledge-based workforce.

AKM set the bar high for change in the Army. The commitment of both the Army secretary and chief of staff to change rapidly translates into similar executive commitment throughout the Army. To effect change in their own organizations, MACOM and functional communities are using the memo's concepts (for example, consolidations, central management of investments, streamlining processes and doing business on the web).

AKM accomplishments

AKM initiatives have resulted in many accomplishments to date. AKO, the Army's enterprise portal and gateway to information, has built enterprise capabilities for universal email, robust search engines, personnel authentication, etc.

Three initial pilots demonstrated AKO's value: the program executive office for command, control and communications systems' Acquisition Knowledge Center; the office of the Army's deputy chief of staff for operations and plans Smart Office Knowledge Center; and the Military Personnel Command's Officer Knowledge Center. The first two pilots built collaborative communities of interest, and the last pilot re-engineered and streamlined military-personnel processes for use on AKO. All three pilots demonstrated cost and cost-avoidance savings in areas such as reduced time spent on accessing and analyzing information, reduced travel dollars attributable to the use of on-line collaborative tools, reduced manpower requirements attributable to internal website consolidations and a reduction in software licensing costs

attributable to applications sharing.

Other AKM results include:

- Establishing the Army CIO Executive Board;
- Linking AKM to the Army Transformation Campaign Plan;
- Establishing more than 35 AKM communities;
- Using AKO for electronic personnel surveys;
- Establishing the annual Army KM symposium, jointly sponsored by the Army CIO and Center for Army Lessons Learned;
- Developing the Army Knowledge Leaders Program for outstanding scholar civilian interns; and
- Completing the Army Science Board study on KM technologies for the objective force.

Summary

Leading the Army's information revolution, AKM is the strategy to transform the Army into a network-centric, knowledge-based force. AKM as a strategic transformer will improve Army mission capabilities, enabling the Army vision for the cyber age. That vision is "soldiers on point for the nation … persuasive in peace, invincible in war."

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This article reprinted courtesy of ***Army AL&T*** *magazine, January-February 2002 issue. The issue features AKM, with several articles on the subject besides the ones appearing in* ***Army Communicator****. Access the magazine via http://dacm.rdaisa.army.mil.*

Acronym QuickScan

AKM – Army Knowledge Management
AKO – Army Knowledge On-line
CIO – chief information officer
DoD – Department of Defense
FEO – functional exchange officer
IT – information technology
KM – knowledge management
MACOM – major command

See also: Army Knowledge On-line brief in "Circuit check," Pg. 38, and article on LTG Peter Cuviello's symposium speech, Pg. 52

EVOLUTIONARY acquisition strategy and the Global Information Grid

by Michael Gentry

In 1900, mankind's knowledge was doubling about every 34 years. By 1990, with the increase in the number of scientists, engineers and researchers, the period for doubling our knowledge was down to only six years. Now that period is only about two years. Faced with this exponential growth in knowledge, it isn't surprising that solutions for problems can change rapidly.

In the field of information technology, let's take a few specific examples to understand how IT solutions can be affected. The famous Moore's Law of semiconductor technology doubles the number of transistors (or computing power) for a given price every 18 months, and that's projected to continue for many more years into the future.

Optical transmission is in the midst of a veritable revolution. The capacity-increase rate is four times every 24 months for each optical channel or "lambda." With dense-wave-division multiplexing, the number of lambdas is doubling (or faster) every year. Today we're up to 160 lambdas, each carrying 10 gigabytes per second for 1.6 terabits per second in a single strand of optical fiber. Recently Nortel announced capacities of 40 gbps per lambda!

In network switching, as described in a presentation titled "Ethernet: not just for LANs anymore" (Passmore, The Burton Group Networks & Telecom Strategy Service, Sept. 18, 2000), ethernet capacity is increasing by a factor of 10 about every two to three years: fast ethernet (100 megabytes per second in 1996), gigabit ethernet in 1998 and 10-gigabit ethernet today. Based on GbE advancements, in the short span of about 12 to 18 months, a new solution (GbE) has swept the old solution (asynchronous-transfer mode) out of the campus-area-networking picture.

The point is not merely that everything in the IT world is getting "faster / better / cheaper / smaller." The harsh truth is that actual technologies and solutions can become obsolete practically overnight. Furthermore, as technology changes at this feverish pace, requirements are evolving just as rapidly. This implies the necessity for organizational, programmatic and acquisition strategies to accommodate this pace of change.

Consider the network-centric information environment within the Defense Department called the

Global Information Grid. The GIG includes all owned and leased communication and computing systems and services, software, data-security services and other associated services necessary to achieve information superiority. The GIG provides capabilities from all operating locations, including bases, posts, camps, stations, facilities, mobile platforms and deployed sites. In brief, it is DoD's IT infrastructure.

The Army's Enterprise Information Technology Program under the Army Knowledge Management initiative falls under the Army's portion of the GIG. Given the pace of change we live with today, fielding "systems" into the GIG where the acquisition cycle takes five to eight years before the product is fielded is a dead strategy. User dissatisfaction and program failure is usually the result when we use this approach.

This phenomenon is clearly recognized and addressed by DoD 5000 and the Clinger-Cohen Act, which requires DoD "to the maximum extent practicable, (1) modular contracting is [to be] used, and (2) the program is [to be] implemented in phased, successive blocks, each of which meets part of the mission need and delivers a measurable benefit, independent of future blocks." Right on! So, how can we apply this to the GIG?

First, recognize there's no final system or solution. The GIG is evolving and will continue to evolve in capability forever, along with evolving user requirements. This isn't spiral development. Spiral development applies to system development and implies that a finished system results from the final spiral twist. This is a continuous technology insertion and evolution of systems capability forever.

Second, adopt an organizational, funding, planning, programming, execution and acquisition strategy that supports this continuous evolution. Specifically, shift away from project managers for systems to PMs for subdomains of the GIG – for example, Army installations, Army tactical battlefield, wide-area networks, etc. Also, shift Planning, Programming, Budgeting and Execution System data from a systems orientation to a domain-sustainment and technology-insertion focus.

Finally, truly follow DoD 5000 by using a continuously evolving acquisition approach where each subdomain PM goes to industry – say, every other year – and describes the current subdomain IT situation and desired operational improvements. The subdomain PM solicits industry's response in terms of how best to advance the subdomain capabilities during this cycle. This approach results in faster improvements and faster return on investment, and it avoids the obsolescence that comes with the systems-development and fielding approach.

The question is whether or not this is technically feasible. Will backward compatibility and interoperability problems overcome this approach? Today, this complete evolutionary approach is becoming possible as industry adopts the Internet protocol as the layer and protocol supporting:

- Technology integration (unified digital environment for computing and communications);
- Multimedia integration (voice, data and video seamlessly handled); and
- Standardization for a heterogeneous vendor environment to exist and work within the GIG.

Using IP as the convergence layer is the key to preserving interoperability across the GIG over time with multiple vendors' equipment employed.

This continuous-evolution approach has precedence. It has been used and has demonstrated the ability to work well in the face of rapid change. The Army's PM for the common-user installation-transport network, a subdomain PM vs. a system PM, was fielding ATM technology for the core of the Army's installation network (essentially a CAN) when GbE technology arrived from industry. Within months, testing of the new GbE gear was completed, technical-architecture changes coordinated and made, and policy adjustments implemented that enabled this PM to rapidly adopt GbE in lieu of ATM. Interoperability was never a problem between the two fundamentally different Layer 2 technologies because they both carry IP packets. Users now receiving the GbE solution are exceptionally happy. Also, older ATM gear is now being quickly replaced with GbE as funds permit, and the transition is swift and smooth.

We're in a period of rapid technological change and transition from the older circuit-switched world to a new packet-oriented world. We need organizational, programmatic, planning, budgeting and acquisition strategies to match or else we'll constantly be fielding obsolete solutions and systems. DoD acquisition policy and regulation already supports the approach outlined here. It's becoming technically feasible across the GIG itself and is more in tune with the realities of the 21st century's IT environment.

As the ad says, "Life is an ongoing project," and so is the GIG.

Dr. Gentry is the senior technical director and chief engineer at Army Signal Command, Fort Huachuca, Ariz.

Acronym QuickScan

ATM – asynchronous-transfer mode
CAN – campus-area network
DoD – Department of Defense
GbE – gigabit ethernet
Gbps – gigabytes per second
GIG – Global Information Grid
IP – Internet protocol
IT – information technology
LAN – local-area network
PM – project manager

U.S. Army Pacific knowledge management

by Libby Christensen and Maria Sadd

The abundance of knowledge-management tools coming onto the market provides structure and knowledge repositories for identifying, organizing and disseminating information. However, KM isn't only about the tools. In fact, individuals who rely solely on the tools may not be successful in implementing KM. Furthermore, KM tools frequently require a substantial upfront investment as well as costly and recurring maintenance. Not only is there more to KM than just the tools, but there are also less costly ways to implement an effective KM program.

U.S. Army Pacific implemented a highly effective KM program that's transforming USARPAC into a knowledge-based organization at minimal cost. Our strategy emphasizes business process and tool reuse, which increases effectiveness by using what's familiar, and contributes to minimizing cost by reducing the need for new tools and training.

One KM challenge facing USARPAC is the organization's dispersed nature, which today spans 16 time zones and consists of Active and Reserve Army forces in Japan, Hawaii and Alaska, and Reserve forces in Washington, Guam and American Samoa. Therefore, while our current KM effort is focused at USARPAC, it's designed to enable knowledge-sharing with major subordinate commands and other service components.

USARPAC approach

KM is a critical enabler as we undergo the Army transformation. USARPAC defined the return on investment for KM as improved product quality and workplace morale. Our goal is to "empower the USARPAC workforce to actively leverage our intellectual capital as a critical enabler for Army transformation and Joint Vision 2020, and to become an effective knowledge-based organization."

Recognizing that KM is overwhelmingly more about people and processes than about technology, we've focused our program on business processes, particularly those supporting our core priority missions. We contracted with the Army's Information Systems Engineering Command KM group to facilitate a series of focused meetings, or charrettes. To achieve KM buy-in, we included staff members from all levels and functional areas in defining the top program priorities and solicited input from senior leaders, subject-matter experts, action officers, information officers, system administrators and administrative personnel.

The charrettes gathered input on the current and desired state of knowledge-sharing in USARPAC by posing questions on knowledge culture, sources, accessibility and responsibility, as well as tools, policies, business practices and issues. Participants were invited to define how to transition to a learning organization. Through discussion and consolidation, we identified seven top priorities that included issues that both apply to the KM program and that will effectively complement and augment our KM initiative.

USARPAC KM implementation

USARPAC's KM implementation is an ongoing process that includes incorporating KM into new and existing programs, modifying business practices to improve efficiency and increase process reuse, and deploying more tools to support business practices. A significant key to our success is the strong support from our senior leaders.

To incorporate KM into the organization's structure, ISEC analyzed the network information infrastructure to ensure that it would support the required information flow and that planned upgrades would continue to support KM implementation. The analysis addressed the local infrastructure and wide-area networks. This effort included the common-user installation-transport network upgrades to ensure our architecture was optimized to support KM implementation and information flow. The analysis took a total-systems approach, including the Defense Department's information-technology security certification and accreditation process, training and user support.

The charrettes helped USARPAC knowledge workers identify those practices and processes with the most impact on our core priority missions. Key processes included resource management, strategic planning, suspense tracking and training. A review of these key processes revealed redundancies, inefficiencies and opportunities for process reuse. Many processes were streamlined and improved by using automation and by turning tacit knowledge into guidelines and checklists for routine and repetitive tasks.

After evaluating the business-process requirements and achieving widespread buy-in, we identified KM tools suited to our needs. Some of our tool-selection criteria include low cost, user friendliness, portability and reusability. Because workflow processes are a large part of KM improvements, the Workflow Management System tool (based on Microsoft Outlook) was selected to

meet our requirements. In fact, the Office 2000 suite, which minimizes our acquisition costs and training requirements, is already our standard. To implement and customize individual views of the USARPAC portal, we selected the Microsoft Digital Dashboard 2 portal framework in compliance with the Defense Collaborative Tool Suite.

USARPAC KM is an evolving process that can be modified based on changing roles and missions. Our information-management panel is also evolving to support KM implementation, advancement and continued buy-in. Several best-practices approaches, including the IM panel, are discussed following.

Best practices

Program integration. KM impacts all aspects of our organization, so we incorporate KM into any new or upgraded system. The previously mentioned example is the infrastructure analysis, where the upgrade was evaluated with KM requirements in mind. Another example is the USARPAC command-and-control functional matrix, which provides information on the level of interaction that must be supported between command elements.

The IM panel. The IM panel was previously chartered to support Clinger-Cohen Act objectives for managing the IT acquisition process, and for establishing goals and performance measures to improve the efficiency and effectiveness of agency operations. USARPAC staff principals are represented on the IM panel and raise, review and discuss IM issues to disseminate information on initiatives and solicit ideas from their respective staffs. Their activities support the top program priorities identified during the charrettes. The IM panel adopted the KM goal to transform USARPAC to a knowledge-based organization.

A significant IM-panel objective is to transition USARPAC into a KM organization. This cultural impact is often overlooked when implementing KM because of the tendency to focus on new technologies. Because few use these technologies, this can easily lead to a KM program failure. By communicating and representing their functional-area staff, panel members maintain interest and participation in the KM program, promote process ownership and maintain buy-in across the organization.

The IM panel reviewed issues the KM charrettes identified and addressed them. After assessing the ineffective use of email ("pushing" information such as blood drives and social events that are more appropriately "pulled") and the forwarding of large and unnecessary files, the IM panel disseminated guidelines for email users.

Another issue they considered was the Army Knowledge Management Strategic Plan objective to incorporate KM into individual-performance plans. The panel tackled problems such as measuring the effectiveness of KM practices. In the process, the IM panel determined that a modification to individual job descriptions isn't needed to add KM to individual-performance plans.

A third example demonstrates cultural impact. USARPAC's senior leaders proposed sharing and viewing calendar information. When the IM panel members polled their staffs, they discovered people were unwilling to share detailed calendar information. The panel modified the proposed objective to allow only individual-availability information to be shared. Thus, headquarters buy-in became possible, and the KM objective was met.

Assessed environment. The KM effort focuses on USARPAC. However, we recognize that for KM to be effective, knowledge-sharing must occur outside the organization as well as within. Our assessed environment includes higher headquarters and joint commands including Department of the Army, U.S. Pacific Command, Marine Forces Pacific, U.S. Pacific Fleet and Pacific Air Forces. We incorporated plans for interoperabiity and also came away with implementation ideas such as reuse of the Digital Dashboard portal frameworks, Digital Dashboard library, conference-room scheduling software and WMS.

Internally, the assessed environment reflects the fact that different functions have different knowledge needs. The charrettes were organized to ensure that KM requirements were gathered from individual knowledge workers across all the organization's functional areas. The IM panel ensures those knowledge workers continue to be involved in KM's evolution.

Modeling. We selected four of the key business processes the charrettes identified, then we developed models of the existing processes as well as proposed target processes. This enabled us to develop metrics and determine whether changing the target processes would produce the anticipated return on investment, develop and validate requirements for appropriate KM tools, and support Clinger-Cohen Act objectives.

Future prospects

USARPAC encourages our MSCs to use KM modules by ensuring our program continues to evolve with interoperability as a critical objective. We facilitate interoperability by selecting standards-based technologies. Extensible Markup Language is one software technology that shows promise as a means to seamlessly exchange information between different applications and databases. USARPAC envisions that files and objects such as Digital Dashboard modules will be ported between external communities of interest using this technology.

We'll continue to foster the success of our KM program, evolving our KM strategy and objectives to meet our Army transformation requirements. Our long-term goals focus on extending effective knowledge-sharing with the joint community and maintaining awareness of KM programs both within and outside the command. As our KM program, organizational culture and technologies mature, we'll continue to remain on point in the Pacific.

Ms. Christensen is a systems engineer with ISEC's Infrastructure Systems-Engineering Directorate at Fort Huachuca, Ariz. She and other members of ISEC's KM group provide engineering support to USARPAC as it plans and implements its KM program.

Ms. Sadd is chief of the IT Plans and Programs Division, deputy chief of staff for IM, 516th Signal Brigade, Fort Shafter, Hawaii. She and her staff are spearheading the planning, beta testing and implementation of USARPAC'S KM program.

This article reprinted courtesy of ***Army AL&T*** *magazine, January-February 2002 issue. The issue features AKM, with several articles on the subject besides the ones appearing in* ***Army Communicator****. Access the magazine via http://dacm.rdaisa.army.mil.*

ACRONYM QUICKSCAN

IM – information management
ISEC – Information Systems Engineering Command
IT – information technology
KM – knowledge management
MSC – major subordinate command
USARPAC – U.S. Army Pacific
WMS – Workflow Management System

'Random thought' leads to knowledge revolution

by Patrick Swan

FORT BELVOIR, Va. (*Army News Service*) – A "random thought while running" has led to more than 800,000 soldiers and Army civilians getting "www.us.army.mil" portable email accounts and access to a host of Army web-based information.

That random thought belonged to now-retired GEN Dennis Reimer, who explained the details of his inspiration during a Jan. 28 visit to the G-6 Chief Technology Office at Fort Belvoir, Va. – home of Army Knowledge On-line.

As the Army's chief of staff from 1995 to 1999, Reimer wanted an informal and timely way to convey his intent to the Army's strategic leadership. He explained to the CTO staff how he found the solution through email. This then-emerging technology allowed him to educate and mentor the Army's general-officer corps with minimal fanfare.

"What we needed was something to supplement the regular information channels during this period of enormous and fast-paced change," Reimer said. "Initially, it was one-way communication, from me to the field. We knew this system had the potential to grow to be a virtual think-tank. But first we had to get our people comfortable with the fundamentals – we literally had to change the culture. I was fortunate there were some real experts available to work out the tough issues, and my part was relatively easy."

Reimer forced that comfort level by sending his newly titled "Random Thoughts while Running" to general officers only through email. To keep informed, the 300-plus general officers first had to become comfortable using Army-issued laptop computers.

Later, when addressing precommand classes at Fort Leavenworth, Kan., Reimer encouraged students to submit questions on their critique sheets that contained their return email address. The former chief said he sent back personal, emailed responses in just a few days.

From basic email mastery, Reimer then pursued the use of online-chat sessions on specific relevant issues with the new brigadier-general selectees. He noted that email input from the general-officer corps even convinced him to modify his position on the Army's new officer-evaluation report, first implemented in October 1997.

"Emerging technologies need champions," Reimer said. "This cannot be a one-shot deal. The younger officers are comfortable with this technology, but some of the older officers needed a little push to get on board."

In 1999, the Army established the Army Portal, also known as Army Knowledge On-line, as a one-stop-shopping site for Army information. Building on Reimer's work, in August 2001 his successor, GEN Eric Shinseki, and Army Secretary Thomas White mandated all Army (active, Guard, Reserve and Department of the Army civilians) personnel to obtain unique email accounts through the portal's address: "www.us.army.mil." These accounts stay the same no matter where soldiers and civilians are stationed worldwide.

The AKO portal is a central part of the overall strategy to transform the Army into a "network-centric, knowledge-based force" through something called "Army Knowledge Management." AKO customers use the portal for a broad range of both business and tactical processes and services, including those in the personnel, logistics, acquisition and e-learning areas.

"AKO provides a series of useful tools for the Army's knowl-

edge-management tool set," said COL Robert Coxe, the G-6 chief technology officer.

Today, the AKO "tool set" is recognized among the military services – and around the world – in applying KM concepts and technologies to the enterprise level of the Army. InfoWorld recognized the AKO portal as 10th in the nation (out of 100 organizations) in November 2001 for its innovative performance in using cutting-edge technologies to improve mission performance. And in December 2001, ***CIO Magazine*** selected AKO as one of the top 50 websites based on "…usefulness, ease of navigation, business value, survival prospects, design and credible content."

None of this seems surprising to Reimer, whom the CTO staff briefed on the progress of his "random thought while running" concept.

"The pace is only limited by imagination and how fast the whole Army becomes comfortable doing business this way," Reimer said. "Our movement toward enhanced situation awareness on the battlefield, which relied so heavily on information technology, convinced me we had to implement this system during day-to-day operations so that the transition from peace to war became as seamless as possible. I knew that once our leaders started using it, they would find ways to take it far beyond anything I could imagine. And that's exactly what the CTO has done."

Mr. Swan is a public-affairs liaison officer with the Army's chief information officer/G-6.

ACRONYM QUICKSCAN

AKO – Army Knowledge On-line
CTO – Chief Technology Office
KM – knowledge management

See also: Army Knowledge On-line brief in "Circuit check," Pg. 38, and article on LTG Peter Cuviello's symposium speech, Pg. 52

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TSM update

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TSM-Tactical Radio

ENHANCED POSITION-LOCATION REPORTING SYSTEM

The Enhanced Position-Location Reporting System is completely fielded to 3d Battalion, 2d Infantry Division (Initial Brigade Combat Team 1), 4th Infantry Division(-) and elements of 3d Infantry Division. This year EPLRS will complete fielding to 1st Battalion, 25th Infantry Division (IBCT Team 2), and 3d Armored Cavalry Regiment. It will also continue fielding in 1st Cavalry Division, which will complete in Fiscal Year 2003.

While fielding continues, so do system improvements. Two major improvements will be featured in the EPLRS systems for fielding in FY03. First, the EPLRS radio-set capacity will grow from 57 kilobits per second to 288 kbps. Second, the EPLRS network-control station will be replaced by the EPLRS network manager.

The 288-kbps EPLRS radio will provide greater bandwidth and, equally important, greater flexibility of bandwidth allocations. The 288-kbps EPLRS radio provides the capacity that a division with three maneuver brigades needs to support its lower-tactical-Internet data requirements. The 288-kpbs EPLRS radio will also allow more Army Battle Command System users to participate on the lower TI.

Production of the 288-kbps EPLRS radio set will begin this summer. All fielding thereafter will be satisfied with 288-kbps-capable radios. EPLRS radios fielded before the production cutover will have to be retrofitted for 288-kbps capacity.

FY03 will also mark the initial replacement of NCS-E with ENM. ENM will better support the warfighter and the Army's transformation initiatives by providing a control system that requires fewer operators and having a smaller footprint than NCS-E. For example, a heavy division currently requires 28 NCS-E operators (seven crews of four soldiers each), while ENM will require 15 operators (five crews of three soldiers each). Each management node will be reduced from a shelter-mounted humvee and support humvee to one humvee with trailer. Also, ENM will reduce the number of required nodes in a division from seven to five.

All these enhancements are necessary to support the growing lower-TI requirements, which support systems such as Force XXI Battle Command Brigade and Below, Maneuver-Control System, Advanced Field-Artillery Tactical-Data System, Forward-Area Air-Defense System, All-Source Analysis System and Combat-Service-Support Control System.

MULTIFUNCTIONALINFORMATION-DISTRIBUTION SYSTEM

The Multifunctional Information-Distribution System Low-Volume Terminal II successfully completed a validation test of the Core software Dec. 3-7, 2001, at the Army's Aviation and Missile Command software-engineering directorate in Huntsville, Ala. The test used two MIDS LVT-2 engineering-manufacturing-development terminals previously provided at AMCOM.

Full-Volume Terminal II has also been scheduled for testing in AMCOM for more verification after the low-rate initial-production terminals are delivered in February or March. MIDS terminals will also undergo supplemental testing for reliability before the initial operational test and evaluation, scheduled to be held during the Joint Combat Identification Evaluation Team test in April.

MIDS' essential mission is to improve secure, jam-resistant information flow and interoperability among Army, Navy, Air Force and North Atlantic Treaty Organization elements as well as Army elements on the battlefield. The Army's MIDS variant, LVT-2, features near-real-time, high digital data-throughput communications, position-location reporting, navigation and identification. MIDS will be assigned to division, corps, echelons above corps and air- and missile-defense units conducting Army operations across the operational spectrum.

NEAR-TERM DIGITAL RADIO, JOINT TACTICAL RADIO SYSTEM

Near-term digital radio and the Joint Tactical Radio System Step 2C are interim radios designed to provide tactical-operations center-to-TOC data communications to units at brigade and below. The first digitized division (4th Infantry Division at Fort Hood, Texas) has been equipped with NTDR. Based on an operational-needs statement generated by Forces Command, the Army has initiated an action to allow procurement of 248 more NTDRs, which will facilitate a "pure fleet" of NTDRs to III Corps. This procurement will ensure interoperability within the corps.

Fielding NTDRs to 1st Cavalry

Division started in January and will keep pace with the unit-set-fielding schedule planned for 1st Cav's brigade combat teams. JTRS Step 2C will be fielded to select BCTs at Fort Lewis, Wash. Although NTDR has been fielded to some BCTs at Fort Lewis, plans are to retrofit these units with the JTRS Step 2C radio. Availability of JTRS Step 2C for fielding is planned for 4th Quarter FY02.

The first block procurement of the JTRS program will undergo Milestone B decision review by the defense acquisition executive during 2d Quarter FY02, followed by the contract award. The first block will satisfy Army-aviation recapitalization and digitization efforts as well as ground-vehicle requirements for all services.

In the operational environment, JTRS operators will load and execute software modules that fit various mission needs to provide interoperability among tactical-radio networks. This capability will enable connectivity for interoperability among our warfighter systems regardless of geography, organizational affiliation, tactical boundaries or currency of the fielded radio systems. Using a standard design for tactical radios, the JTRS concept is a great qualitative leap forward in attaining interoperability across joint forces while simultaneously working to modernize the tactical-radio architecture. JTRS also promises to reduce the logistical burden in future operations.

ACRONYM QUICKSCAN

AMCOM – Aviation and Missile Command
BCT – brigade combat team
ENM – E(nhanced Position-Location Reporting System) network manager
EPLRS – Enhanced Position-Location Reporting System
FY – fiscal year
IBCT – initial brigade combat team
JTRS – Joint Tactical Radio System
Kbps – kilobits per second
MIDS – Multifunctional Information-Distribution System
NCS-E – network-control station E(nhanced Position-Location Reporting System)
NTDR – near-term digital radio
TI – tactical Internet
TOC – tactical-operations center

Pulse

Commentaries and letters to the editor... to correct "the record" and express opinions

To the editor,

Although I regret to admit I personally don't have access to your publication, I was able to find enough information on the Internet in a short time to convince me that you might be able to help me.

I'm in a unit that lacks enough Single-Channel Ground and Airborne Radio System radios, but lacks their vehicular installation sets even more. Unfortunately I've had a few problems in obtaining these much-needed items. My first problem occurred when I looked for the installation kits' original records and found that no specific kit was named. So I used the only "vehicular sets and authorized installations" bulletin my unit has (and this also seems to be the only one we can get a hold of) – sadly I found no kit was named for the vehicle I need.

I'm the only commo person in my unit and am inexperienced (only a specialist with three years' service), as I have nobody above me to learn from. Everything I've done was of my own accord, and I fear I may have missed an obvious answer. My unit is a fuel-transport company with only three of about 58 fuel trucks having SINCGARS capability. Obviously this isn't acceptable, so the commander and I agreed to make as many trucks SINCGARS-ready as we can; thus the shortage of SINCGARS doesn't complicate the mission by having only selected trucks available to use them in. Obtaining SINCGARS would also solve the problem of having to resort to conventional citizen-band radios for communication during training.

In short, the vehicle is the M915A2 … and I have no installation kits for it. Yet I know it's possible since three of them are already equipped. Can you provide any assistance in this area?

SPC Lonnie McNerney
737th Transport Company
Washington

*(**Editor's note**: This is what **Army Communicator** is all about: professional development. I know there are some non-commissioned officers or officers who can answer the question on the installation kit, if not how/when 737th TC can receive SINCGARS. Since the answer can professionally develop other Signaleers in open forum, send your answers to **Army Communicator** for publication. For anything specific and unique to 737th TC, I'll forward directly to McNerney. The address to write **AC** is: CDR, USASC&FG, ATTN: ATZH-POM (**Army Communicator**), Bldg 29808A Room 707, Fort Gordon, GA 30905.*

*The next series of letters involves a query sent to **AC** for forwarding to retired LTC David Fiedler, a frequent contributor to **AC**, about his article in the Summer 2000 edition on the PRC-117F. Although some things regarding the situation are specific to the Coast Guard officer and his unit, there is a lot of information on that particular radio provided which makes this – as the schoolhouse folks here at Fort Gordon, Ga., say – a "teachable moment.)*

LTC Fiedler,

I read your article about the PRC-117F at http://www.gordon.army.mil/regtmktg/AC/SUMR00/sofradio.htm. Have you heard anything regarding how reliable these radios are when operated on small boats? We're using the PRC-117D(C) model on our 25-foot Boston Whalers and

have had a terrible time keeping the radios on-line. Our breakages normally involve one or more of the internal cards popping out during operations. Our boats take quite a beating because of the combination of the aggressive tactics we use and the rough weather / heavy seas we regularly encounter in our area of responsibility.

LT Brian Warn, U.S. Coast Guard Reserve
Communications officer, Port Security Unit 313
Seattle, Wash.

LT Warn,

I know of no shock or vibration problems with either the 117D or the 117F. While still in the active Army National Guard, I used a 117D during OPSAIL while working with the Coast Guard off the cutter ***Sturgeon Bay***. We had no problems at all, but a cutter is a much different environment than a 25-foot Whaler, as you well know. We also used them in some of the smaller boats, also with no problem, but the environment was not too rough.

Both radios meet Mil-Std-810D, and the ones I've had seem to hold up pretty well, so I'm very surprised to hear of this problem. I'm reluctant to recommend a fix, but I've seen some Army guys add a rubber strip between the circuit cards and whatever holds them in place to put more pressure on the card. The radio is usually built like that, but over time the original rubber wears out and the card gets loose. You could also box the radio in some foam packing, which may be better, since going into the radio by yourself is probably not a real great idea.

I'm sending a copy of your email to Harris [Corporation]. I'm sure they'll try to help you out with some better ideas. Harris is usually very good about helping solve problems like this since they treat their customers pretty well, and I'm sure they'll have some better ideas.

There are shock mounts for the radio also, but I assume from your email that you're using them as a manpack. The mounts work pretty well if you have power available in the boat. Mounts also save batteries, which cost plenty, and always assure you have full power for transmit.

I think the Harris guys will contact you. If not, give me a call at (732) 532-3760 and I'll get you in touch with the right people at Harris.

Dave Fiedler

LT Warn,

I was forwarded an email regarding the AN / PRC-117D(C) radios, and I understand you've been experiencing some difficulty.

The radio chassis has a top cover that fits very securely to the top of the chassis. The top cover also has some strategically placed foam rubber pieces that firmly seat the cards and make it such that they cannot inadvertently unseat during mechanical shock. The top cover is held in place by the outside cover, which fits pretty snugly over the chassis. The overall package has been tested under many shock and vibration scenarios, although I realize the environment of the Boston Whalers is unusual and severe.

One possibility is that the chassis top cover has been left off when the radio is placed into the outside cover. This is theoretically possible, the radio would function, and the possibility would exist for the cards to have enough "travel" for them to become unseated. Unseating the cards is virtually impossible with the chassis top cover in place. Another possibility is that the foam rubber on the inside surface of the top cover has been removed while in maintenance cycle.

In any event, if you would like for us to inspect the radios and can have your maintenance shop forward any of them to us, we would be glad to help you with this problem.

Please feel free to contact me at (716) 242-3180 or Cherie Cremaldi at (716) 242-4201 at your earliest convenience. Cherie is a technical-support engineer and has extensive experience with repairs and upgrades to the 117D and 117F series radios.

John Stevens
Former project engineer for the AN / PRC-117D(C) family
Manager, field engineering and product service
Harris RFCD

Mr. Stevens,

Yes, we do operate our boats in an extremely demanding manner. Because of the combination of the Boston Whaler's hull design and our aggressive tactics, the 117s experience vibrations / forces that are at least equivalent to someone rapidly and vigorously pounding the bottom of the radio chassis with a large rubber mallet. The radios are mounted onto a shock-absorbing plate, but I don't believe the shock dampeners are responsive enough to adequately or properly cushion the radio cards during boat operations.

Four of our 117s are currently at the Harris Rochester repair facility awaiting Coast Guard funding for repair. I'd appreciate it if you would have them inspected while they are there.

LT Brian Warn

LT Warn,

Great; I'm sure the Harris guys will find the problem. In the meantime, try lining whatever the radio is mounted on with the foam packing used in shipping. The black stuff usually works the best. The closed cell foam from an Army standard-issue sleeping mat also works well. Just slice it as thin as you need and insert between the radio and whatever it is resting on. This usually cushions the shock pretty well.

If the shock mount is in a small space near something solid like ours usually are, pack the space between the foam to cushion the travel and sudden stop. It's like putting a pillow between the hammer and the radio. It's crude but it works.

Let me know how it all works out.

Dave Fiedler

SIGNAL SOLDIER REMEMBERED: SPC ANTHONY BRYSON WARD, POSTHUMOUS PURPLE HEART

by LTC Thomas Gilbert

Today our Army is focused on the new war against terrorism initially being waged in Afghanistan. It's fitting that in the renewed climate of patriotism, an oversight from the past was recently corrected. On Dec. 8, 2001, the only Signal soldier to die in Operation Just Cause – the invasion and liberation of Panama in 1989-90 – was finally recognized and awarded the Purple Heart medal. His family received his posthumous Purple Heart from the commanding general of 75th

Division in Houston, Texas.

SPC Anthony Bryson Ward gave his life in the service of his country while assigned to 5th Battalion, 87th Infantry, 193d Infantry Brigade, based at Fort Clayton, Panama. I had the privilege of serving as communications officer for 5-87th Infantry with Ward before and during Operation Just Cause. Ward served under me as a radio-communications specialist and was dual-hatted as assistant section chief for the frequency-modulation radio section and as team chief of a retransmission section. Before coming to our unit, he attended communications training at Fort Gordon, Ga., and held various assignments until he was assigned to the Republic of Panama.

Figure 1. SPC A.B. Ward as a recruit.

When he arrived in Panama, he was assigned to our barracks on Fort Clayton. He quickly adjusted to military life in Panama and learned to love the country and its wonderful people. He seemed to always demonstrate a zest for living and yearned to experience new adventures. Unfortunately at that time, the United States was preparing for war in Panama. The Panamanian dictator, Manuel Noriega, was openly hostile to the United States and made increasingly aggressive actions against the Americans stationed in the former Canal Zone. His control of the Panamanian government and the Panamanian Defense Force – or, as we called them, the PDF – was absolute. Despite the tension and strife at that time, Ward found time to expand his horizons and enjoy life.

I often found Ward staring out our barracks windows looking toward the Panama Canal. Fort Clayton was situated directly across from Miraflores Lock; the big ships cruised a stone's throw away from our barracks. He enjoyed the sight and dreamed of the faraway lands the ships were visiting.

Ward also had an uncanny ability to make friends. Once you met him, his warm smile and friendly demeanor made it seem you'd known him for a long time. Our communications crew became best friends while serving under difficult, hazardous and hostile circumstances. Recently a television miniseries called ***A Band of Brothers*** attempted to capture the bond that forms among soldiers under such conditions. As in the movie, our team formed cohesion found only under a wartime environment of hardship, stress and stolid determination to accomplish the mission. These young men represented a cross section of America and truly became a band of brothers.

Ward was athletically inclined, very competitive and a superb runner. I remember he was especially good at long-distance running. He would always join the fast group during physical training and would push us to run faster. One day we were conducting a five-mile run. About a half-mile from the end of the run, we were released to sprint the rest of the way back to the barracks. You see, being among the first runners back was very important, as they are the ones who got the hot water in the showers.

Ward and I started out together, but I quickly became winded. After all, I was an "old man" at 33 years of age. As I started to slow down, Ward called out "tactful" words of encouragement such as "Come on, Grandpa!", "Geezer!" and other playful taunts that are inappropriate to repeat in this forum. Needless to say, I was motivated to increase speed, but Ward easily increased the distance between us and I was unable to grab him to "show my appreciation." I don't think Ward ever had a cold shower after PT.

During Operation Just Cause in December 1989, our infantry battalion was tasked to seize several key installations in the Panama Canal area. Ward's job was to provide critical command-and-control service for the deployed companies. At times he manned the primary retransmission site on top of Ancon Hill to provide FM communications among the deployed infantry units, 5th Battalion operations and 193d Infantry Brigade headquarters. We called the site the "Bull's Eye" because it was exposed from all sides and was a prominent American position within range of most PDF weapons. It was a simple matter for the enemy to simply aim at the top of the mountain.

On several occasions his duty placed him in direct lines of fire from the PDF. The heaviest fighting took place as the PDF defended the perimeter around the Commandancia (the main PDF headquarters building in Panama City) and the main police station. Ward served alongside infantry soldiers who were later to be awarded the Combat Infantry Badge – an award he, as a Signal soldier, was ineligible to wear. To tell you Ward was unafraid would be incorrect. However, while most troops had many fears, I am aware that he only had one. His fear was that he would somehow let down his buddies, his team, his unit, his Army. As events transpired, he served as a model soldier and performed his duty in an exemplary manner in service to his nation. He never once let us down.

As the fighting ebbed in the cities and our battalion was committed further into the rural areas, many of our meager support vehicles were committed to these distant operations. As a result, our communications sites within the city were without supply vehicles, and our sites required a large amount of fuel for the electrical generators. Fuel for these and food for the troops were my main supply concerns. Crew chiefs at each site – curiously except Ward's – continuously called me for more supplies, fuel and food. I knew they needed replenishment, but I could only serve the bare minimum.

I was also curious why Ward didn't badger me like the rest of them. My curiosity was cured when I saw him riding in a former PDF pickup truck flying an American flag and with black spray paint over the PDF insignia on the door. As I should have expected, the commandeered truck was pulling out of the McDonald's parking lot, and between Ward and the driver were several bags of food. In the pickup's bed were several full gas cans

with the initials "FFDD" emblazoned on the sides. (FFDD is the Spanish acronym for what we called the PDF.) Ward once told me, "If you don't have luck, then you haven't looked for it." He was exceptionally resourceful.

After liberation of the populated areas surrounding the Panama Canal, Ward served on missions deep in the Panamanian highlands. His job was to provide a secure and reliable command link from the battalion's deployed elements to the sustaining base at Fort Clayton. On one such mission, we were sent to the Hato Chame area deep in the mountains of northwest Panama, more than 250 miles from the canal. We were ordered to search for any remaining PDF forces that had pulled back into the hills and reportedly were planning a guerrilla war. As a light infantry battalion, we had limited support capabilities for such a mission.

Here again the supply situation became difficult. After a few days, it became apparent we were short of rations and other supplies. Ward, always the resourceful one, contacted local inhabitants and arranged for the purchase and delivery of home-cooked hot food for his crew. When the mission was over, most soldiers – who had been subsisting off cold meals-ready-to-eat food packets – had lost weight, while the commo crew, thanks to Ward, had actually put on a few pounds.

While out in the highlands, Ward told me that when the fighting was over, he was going to continue his education and get a college degree. I was proud of his decision and was excited that he would tackle new challenges on the academic front.

Once most hostilities ended, the "first" President Bush declared Operation Just Cause a resounding success. Personnel-movement limitations were eased. Like most of us, Ward was happy to have more freedom and relegate the fighting to history books. However, much shooting was still taking place, and many disagreed the fighting was over.

Regardless, during that first weekend of relaxed PMLs, Ward went to an American restaurant in Panama City. As he was eating, a terrorist threw a hand grenade through the front doors. The grenade bounced down the stairs and rolled under his table, where it detonated, causing him severe injuries. He was immediately transported to Gorgas Army Medical Center in Panama City. When I was notified he was severely injured and in dire need of blood, I rushed to the hospital. After I checked on his condition, I hurried down the stairs to the blood-donation area. There, lined up in the dim hallway, was Ward's own band of brothers. They were there to give their life's blood so that one of their own would have a chance.

We comforted each other but were helpless to do more. Ward had been mortally wounded.

Tocumen Airport had just reopened, and his parents arrived in Panama the day he died. It's rare for a fighting unit to have the family present at such a tragic time. We felt helpless to console them, but we knew we could rely on Army traditions to help us through those tough times. When it came time for his parents to take Ward home, his crew formed the honor guard and carried his flag-draped casket onto the cavernous C-5 Galaxy at Howard Air Force Base. After we lowered his casket in place on the aircraft, we knelt beside his casket and bid Ward a final farewell. He was returned home to Texas and is buried in Houston.

On the 10th anniversary of Ward's death, I contacted his parents to tell them Ward wasn't forgotten and to wish them my best. I learned they hadn't received his Purple Heart. As I discovered, and as sometimes happens in large organizations, his posthumous Purple Heart award packet was misplaced. Once the oversight was brought to the Department of the Army's attention, the wheels of bureaucracy started grinding and the award was forthcoming. We apologized to the family for the delay in recognizing Ward's sacrifice to his nation.

Ward was a Signal soldier of the first degree. His only concerns were for his communications mission and for his fellow soldiers. For such a tragically short life, he left an enduring legacy. The legacy I am familiar with is one of honor to his nation, selfless service to his unit, dedication to his teammates and eternal membership in the Army band of brothers.

LTC Gilbert is the active-duty liaison to the Reserve Command and General Staff College cell in Nashville, Tenn. He enlisted in the Army in 1975, serving as a light-weapons infantryman. After he completed his enlistment, he obtained a bachelor's degree using his GI Bill benefits and returned to the Army in 1982 as a Signal officer. He said he has served in "all the usual Signal jobs" (platoon leader, company commander, S-3, battalion executive officer, etc.) and is retiring May 31. "Thanks to the Army, I am leaving with two master's degrees (MPA and MBA) and a PhD in economics," he said.

ACRONYM QUICKSCAN

FM – frequency modulation
PDF – Panamanian Defense Force
PML – personnel-movement limitation
PT – physical training
SINCGARS – Single-Channel Ground and Airborne Radio System

G-6 planning and supporting Signal battle command

by CPT Matt Armstrong and LTC Lori Sussman

This article discusses the G-6 Signal planner's role in the division course-of-action development process, wargaming process and battle-tracking and reporting process. The G-6 planner must learn and apply these processes to the overall pursuit of an endstate, which includes not only the division's operations plan but also creation of the Signal execution matrix and the overall division communications-support plan.

It's important to understand the roles and responsibilities of other division-staff members to coordinate properly. The G-6 planner must be clear as to the planner's role vs. the Signal battalion S-3's role during the military decision-making process. In this way, the G-6 planner ensures the division commander has seamless voice and data communications through all combat-operations phases.

Planning with division graphics

To conduct the planning process to standard, the G-6 planner must execute the preparatory phase of MDMP first by accurately creating and applying the use of Signal operational graphics and overlays in conjunction with the division's graphics. These final products will aid not only the G-6 planner in providing the overall division communications-support plan, but they also will provide a useful tool for the Signal battalion S-3 to use during the battle for current battle-tracking and future operations.

The first priority for the G-6 Signal planner is to obtain the correct map sheets of the current operations area and apply current division graphics to them. These map sheets will preferably be 1:50,000, and the graphics will reflect the most current division tactical information – including tactical assembly areas, Paladin assembly areas, engagement areas, main and alternate supply routes, forward-edge-of-battle areas, target-reference points, no-fire zones, templated enemy locations and likely enemy avenues of approach. On the graphics, the G-6 planner will identify all key terrain that will aid in installing key Signal assets, as well as other key terrain such as flight landing strips, river-crossing points and areas where Signal support isn't feasible.

When the mapboard and graphics have been correctly set up with the most current and accurate information, the G-6 planner must then plot the current locations of all key division assets. These assets include (but aren't limited to) Multiple-Launch Rocket System locations, Q-36/37 Firefinder locations, Avenger missile locations, TRQ (a signal-intelligence-gathering piece of equipment used by military intelligence) locations, forward ammunition-resupply points/battalion-support areas/cache locations, attack-helicopter locations and airstrip locations. In addition to these key areas of concern, the G-6 planner will plot the locations of the three division command posts: the division tactical, division main and division rear CPs. If possible, the G-6 planner will also add the brigade and separate-battalion CPs as well. In this way, the planner can determine if there are enough mobile-subscriber equipment and frequency-modulation assets to connect all three division CPs to each other, and for the division CPs to connect to the major subordinate commands the division is controlling.

Plotting this data and preparing the map and graphics falls on the shoulders of the G-6 planning noncommissioned officer. The planning NCO is also responsible for constantly maintaining situation awareness about the entire battle and must continually update the deputy G-6 and other G-6 planners. The G-6 planner, however, will ultimately be responsible for ensuring the map's and data's accuracy, as

Military decision-making process

Phase	Products/tasks
Mission receipt	Prep map; apply division graphics; plot key locations
Mission analysis	Identify implied, specified tasks; constraints; facts; assumptions
COA development	Provide feedback to G-3/Signal battalion S-3 on feasible COAs
COA analysis (wargame)	Signal execution matrix
COA comparison	Briefing to CG
COA approval	CG's decision
Orders production	Annex K
Rehearsal	Annex K; Signal execution matrix

well as their timely updating throughout the course of the battle or operation.

G-6, Signal battalion roles

With all initial preparations complete, and after the division warning order / operations order has been received, the G-6 planner is now armed to properly execute his estimate of the situation. This involves carefully and meticulously analyzing higher-up's warno / opord and extracting pertinent information that will aid the planner in making a precise picture of the battlefield and how best to support the maneuver elements. During mission analysis, the planner will identify specified and implied tasks, and determine from those the essential-tasks constraints. At the same time, the planner must also identify key planning assumptions and facts, as well as key terrain, and begin to formulate requests for information necessary to continue the planning process. All this extracted information will be fed back the division G-3 planners.

During this phase, the G-6 planner must also coordinate with the Signal battalion S-3 and unit S-6s to get a clear picture of assets on hand. A fundamental question that's continually asked is, "How do the roles of the G-6 differ from the roles of the division Signal battalion?" The G-6 planner is part of the MDMP process and determines the feasibility, acceptability and suitability of a given COA as it pertains to Signal. The planner must know doctrinal distances and understand how to deploy assets to make those determinations.

However, actual network planning and implementation is the Signal battalion's role. The Signal battalion S-3 provides a supporting MSE network architecture the Signal battalion commander briefs as part of the orders process. Before the handoff between the G-6 planner and the Signal battalion S-3, there's the MDMP process, which helps both G-6 and S-3 derive a supporting Signal structure for division warplans.

Coordination with other division staff

With all requisite information in hand, the G-6 planner is now ready to begin the COA development and wargaming process. It's crucial during this planning phase that there's a clear dialogue between the G-6 planner and G-3 about what Signal brings to the fight. In other words, what could Signaleers provide the division in terms of equipment, soldiers and maintenance readiness to support division operations? This knowledge is critical to the warfighter's flexibility in a particular COA.

After mission analysis, the Signaleer must be prepared to provide guidance to the other division planners on which distinct COAs aren't feasible based on mission, enemy, terrain, troops available-time as it applies to Signal. If a COA can't be supported for any reason, that must be clearly enunciated as early as possible in the MDMP process to prevent developing an unsupportable COA.

If all COAs are feasible from the Signaleer's perspective, the G-6 planner must then cross-talk with the Signal battalion S-3 to let the battalion know what the COAs are so it can begin its parallel-planning process. Once the Signal battalion S-3 confirms feasibility from its perspective, the G-6 planner is ready to take part in the COA analysis, better known as the wargaming phase. The end-product from this phase is a feasible MSE and FM communication strategy supporting the division maneuver COAs.

Signal on the battlefield

During the COA and wargaming processes, the G-6 planner must pay careful attention to the particular Signal architecture supporting the three division CPs to ensure they can be dual-homed. Another critical concern to the G-6 planner is the ongoing struggle between the need to occupy terrain conducive to building the network while providing force protection to our Signal forces at the same time. Ultimately, the need for force protection will always win out because a soldier must survive to provide communications. Therefore, the planner must initially coordinate for base clustering while keeping a keen eye out for suboptimal terrain where the enemy is unlikely to look for our assets but where we can still support the network.

A base cluster is a collection of critical division assets that aren't necessarily colocated but do provide mutual support to each other. The base cluster creates not only mutually supported positions on the battlefield, but it also provides force protection to key division assets and aids in defending against and defeating bypassed units or special-operations forces roaming the AO. Clustering in suboptimal terrain is also an effective protection strategy for your cluster of units that need high ground to support the division. Suboptimal terrain is simply terrain which isn't likely to be identified by the enemy as key terrain and therefore not templated by his artillery, but at the same time it will provide the minimal requirements to install, operate and maintain division communications systems.

It's up to the G-6 planner to find and coordinate these sites with other key division assets needing placement on high ground. Keep in mind that movement on the battlefield will severely restricted. Movement and terrain occupation will always have to be coordinated with the provost marshal and division transportation officer as well as with the brigade that owns that terrain. It's important to try to move Signal assets with other friendly units on the battlefield for force protection. The G-6 planner will make that initial coordination with other planners.

Bottom line: base clustering, suboptimal terrain and integrated movement slows the pace of movement, and often the shots will be marginal or there will be problems with dual-homing. However, Signal assets will be available throughout the battle's course. The Signal battalion commander / assistant chief

of staff G-6 will address those risk or concern areas during the confirmation brief and backbrief processes.

During COA development and wargaming with the division's planning staff, it's up to the G-6 planner to articulate and coordinate all Signal-asset movements on the battlefield as well as to or around the division CPs. The G-6 planner must also communicate effectively about the Signal plan to the other division planners on a level that everyone can understand. This isn't the time or place to be bashful. This is the perfect time to coordinate movements and locations and to find out the anticipated placements of other key division assets through cross-talk with division planners.

Staff cross-talk during the MDMP process is critical. Signal planners coordinate with the forward-logistics-element planner to develop initial no-fire zones and free-fire zones. Also, the G-6 planner gets the location of key artillery assets, including MLRS and Q36/37 Firefinder. This information's purpose is to give the Signal battalion options on colocating with those radars or artillery systems to enhance protection for Signal assets as well as start a good base cluster.

From G-3 Air, the G-6 planner gets the location of key airstrips, FARPS and key aviation assets as well as lift assets. The G-6 planner also uses this information to colocate in protected areas. The information also allows him to set conditions for airlifting Signal assets and starts the coordination process for aerial FM retransmission. A good G-6 planner will also coordinate with the air-defense-artillery element for Signal protection and to get the status of routes and mobility corridors.

Coordination also extends to the G-4 planner to get Signal priority of repair, movement and reconstitution. The G-4 planner also has information on decontamination, refueling, cache and FLE sites. The division's air-defense-artillery officer provides information about ADA support locations critical to smart base clustering. Again, colocating with Avenger systems on high ground enhances Signal protection tremendously.

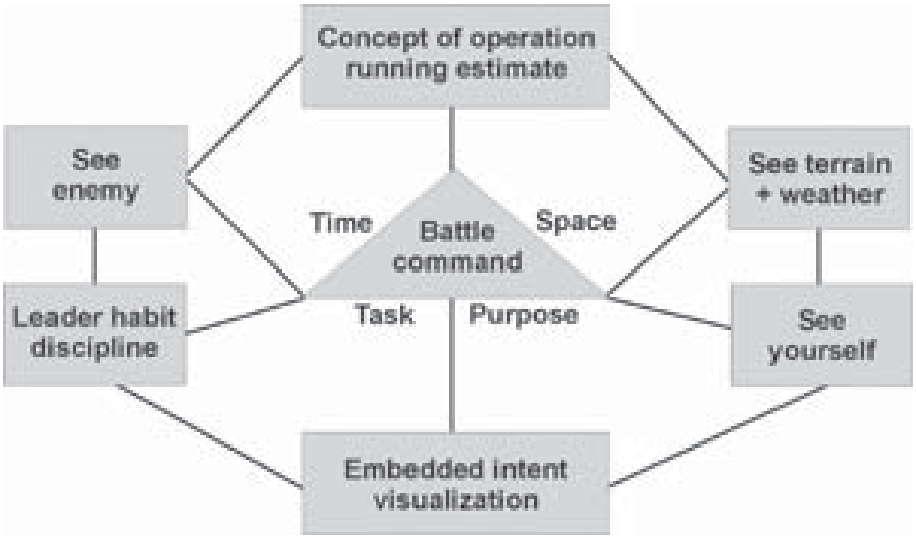

Figure 2. Battle command in garrison and in the field.

The DTO and PMO will have MSR/ASR information. The G-1 provides priority for replacements in the division. Finally, the G-2 will provide critical information on the enemy's capabilities – including weapons systems, artillery, weather effects, enemy SOF capabilities and templated enemy locations.

One begins to see the big picture as the G-6 planner gathers this critical information on the division's AO and areas of concern. After all this staff cross-talk, it becomes the G-6 planner's responsibility to ensure the information is disseminated to the Signal battalion S-3 so it can plan the best possible network.

Wargaming and the execution matrix

When the COAs have been developed, the G-6 planner must decide how best to support each COA during the wargaming process. The G-6 planner must speak for all division communications assets and make sure each operations phase has the necessary and required Signal support for the maneuver units. As Signaleers, it's our goal to provide cascading FM and MSE coverage about five to 10 kilometers in front of maneuver units.

It becomes possible for the G-6 planner to conceptually develop the scheme of communication support necessary for each COA through proper staff cross-talk and asset analysis. By taking careful, detailed notes during the wargaming process, it's possible for the G-6 planner to construct an initial execution matrix for Signal support the Signal battalion S-3 can use to develop the Signal network. By backward planning and implementing a reverse battlefield-operating-systems analysis, it becomes possible to build the matrix with much detail on possible placement of FM, radio-access units and node centers. By using a few planning rules of thumb, the matrix almost builds itself based on the operational flow.

The G-6 planner uses the respective planning ranges of the RAU, NC and FM retrans to develop movement strategies and suggest which unit should get tactical control of Signal assets for movement. It's also helpful to keep in mind that the DTAC will displace about every 12-18 hours and the DMAIN will displace every 24-48 hours. In this way, the G-6 planner can test feasibility, acceptability and suitability of each maneuver COA as well as suggest decision points for the Signal battalion commander and ACofS G-6.

After the wargame, the G-6 planner constructs a detailed execution matrix consisting of the three division CPs, the MSC/separate-

battalion locations, coverage provided at various points in time and space on the battlefield, and the location and movements of key Signal assets on the battlefield. This includes NCs, small and large extension nodes, RAU, line-of-sight relays and FM retrans. This execution matrix becomes a powerful tool for the G-6 planner, unit S-6s and the Signal battalion S-3 shop. This tool will allow division Signal planners to exercise battle command for Signal.

Developing this matrix is a leader habit and discipline. It helps all division Signaleers understand the commanding general's intent, then visualize and create an operations concept that incorporates a running estimate, takes weather and terrain into planning considerations, and allows everyone to see the enemy's impact on Signal support.

Annex K

During the COA comparison, the G-6 planner presents Signal-screening criteria and assesses COA supportability as well as summarizes the relative advantages and disadvantages of each COA. This is also an opportunity for the G-6 planner to educate the rest of the division staff. If G-3 planners understand fundamental issues that make communications more supportable, this will improve command-and-control planning during follow-on planning sessions. When you can, take the opportunity to discuss and explain how and why each COA achieves better or worse agility, initiative, depth, synchronization and / or deception by the way Signal can be implemented. This is a chance to talk Signal, but use the tactical lexicon vs. Signal jargon to maintain credibility and so you are fully understood.

When the division-level COA analysis and comparison is complete, the division staff briefs the CG on each COA and seeks a decision on which COA to implement. The staff then prepares the opord upon the CG's decision. During this phase of the planning process, the G-6 planner must build / create Annex K. The G-6 planner will then have two useful tools to provide the Signal battalion for its part of the orders process after this phase of MDMP concludes. It becomes that much easier to talk the Signal plan during the division rehearsal / rock drill once these products are in hand.

Finally, part of the G-6 planner's mission is to be able to provide timely and accurate information about Signal assets and how they affect the division commander's running estimate. Also, it's necessary to use a reverse BOS analysis to focus on where and how Signal assets may be attacked by the enemy. Once the G-6 has done this level of analysis, he will have a clear understanding of the operation and will be able to provide the command group an accurate battle-update brief. With the execution matrix in hand, this information is easy to provide and discuss in detail. In the CG's battle-update brief, all significant events of the past 12 hours and next 24 hours – including Signal moves and Signal coverage – should be reported.

The G-6 planner plays a significant role in tying together all the division's communications assets. He's also a crucial link in disseminating critical information to and from the Signal battalion and to the division staff. With a firm understanding of everyone's roles and responsibilities, as well as knowledge of systems and enemy threat, the G-6 planner makes sure the plan developed supports the warfighting commander's objectives. The products the G-6 planner creates provide useful tools for all the division's Signal elements to use while planning and providing Signal support to the division's maneuver elements. These tools will allow Signaleers to exercise Signal battle command and provide powerful command, control, communications and computers support within the division.

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Acronym QuickScan

AcofS – assistant chief of staff
ADA – air-defense artillery
AO – area of operations
ASR – alternate supply route
BOS – battlefield operating system
CG – commanding general
COA – course of action
CP – command post
DMAIN – division main (command post)
DTAC – division tactical (command post)
DTO – division transportation officer
FARP – forward ammunition-resupply point
FLE – forward logistics element
FM – frequency modulation
MDMP – military decision-making process
MLRS – Multiple-Launch Rocket System
MSC – major subordinate command
MSE – mobile-subscriber equipment
MSR – main supply route
NC – node center
NCO – noncommissioned officer
Opord – operations order
PMO – provost marshal's office
RAU – radio-access unit
SOF – special-operations forces
Warno – warning order

Battle command on-the-move:

information as a decisive element in combat power and how we're working to achieve this

by CPT Kenneth Morris

During home-station train-up at Fort Hood, Texas, for 4th Infantry Division's division capstone exercise (DCX Phase I), COL Robert Cone, commander of 2d Brigade, 4th Infantry Division, received approval from his division commander to supplement his M2A3 command vehicle with more Army Tactical Command-and-Control System equipment. Cone requested this capability to more efficiently C2 his digitized brigade and to have increased and sustained situation awareness while on the move and away from his tactical-operation centers.

This was only one example of why Cone and his brigade executed a very successful training rotation at the National Training Center, Fort Irwin, Calif. However, it's noteworthy because he forwardly deployed his combat vehicle away from his TOC and, with his ATCCS' assistance, he gained information dominance of the battlefield. By achieving information dominance, Cone and the Raiders of 2d Brigade Combat Team significantly assisted Training and Doctrine Command in validating one of the seven exercise objectives: "assessing the brigade's ability to employ information as a decisive element in combat power."

As TRADOC's proponent for brigade-and-below C2, we at the Armor Center, Fort Knox, Ky., are trying to capitalize on Cone's insight and apply appropriate doctrine, training, leaders, organizations, materiel and soldiers-based solutions across the Army's transformation axes. This article discusses our efforts in this.

"With this capability, I wasn't required to stay at my command post, but I could move forward on the battlefield and get a personal, up-close view of the battle," Cone said. "If I wanted or needed to talk with a battalion commander or soldiers in my brigade, I could locate them on my Force XXI Battle-Command Brigade and Below System and then drive to their location."

In addition to better C2 and situation awareness, Cone's battle command on-the move proved to be a morale and esprit de corps builder. Most soldiers were shocked when they saw their brigade commander at their location, but their shock turned into motivation, knowing their commander was with them in the fight.

Another closely related key insight from DCX I was that the Force XXI heavy digitized division doesn't possess the equipment and personnel the table of organization and equipment authorizes to adequately execute BCOTM at brigade-and-below level according to the operational concept. The commander and his operations group need survivable, mobile combat platforms with appropriate information systems that provide execution-based core functions during tactical engagements and battles.

Shortfall

Currently there's a TOE shortfall in the Force XXI maneuver brigades' headquarters combat vehicle that doesn't account for emerging requirements (personnel and equipment) to provide the maneuver commander with the ability to maintain situation awareness and subsequent control of assigned forces. Before he departed command, Cone submitted changes to his modified TOE based on the success of his NTC rotation. His recommended changes included adding appropriate information systems to the commander's vehicle, authorizing a similarly equipped platform for the brigade S-3 and adding another M1068 to the brigade tactical command vehicle.

Also, Cone recommended that five more soldiers fill key positions in manning the equipment and sustaining a 24-hour operational capability within the command group and the brigade's tactical command post.

Definition

BCOTM, simply stated, is the requirement for a commander to conduct battle command and leadership while detached from his static CPs. In viewing the modernization of legacy forces and the requirement for the commander to execute offensive-oriented and distributed operations throughout his assigned battlespace, BCOTM becomes the maneuver commander's essential capability to fight decisively forward and create a "commander-centric, mission-focused" organization instead of a "TOC-centric" organization.

In the expanded battlespace of digitized-division operations, placement of key people and facilities is of special importance. The maneuver commander may opt to position his command vehicle in a location that distributes senior leadership in depth throughout his operations area, allows observation and command presence at a decisive point, or provides senior-leader

presence on separate mobility corridors.

Why BCOTM for DCX II

Immediately following DCX I and based on the recommendations contained in the exercise's initial-insights memorandum, TRADOC's commander tasked the Armor Center to detail a more narrow focus on C2OTM at division, brigade and battalion level. One of our key tasks was to develop an operational and organizational concept for battle command at brigade-and-below that articulates the requirement for the commander to access relevant information and execute battle-command tasks untethered from CPs. Another key task for us was to develop an operational architecture for battle command at brigade and below using the approved O&O, followed by development and refinement of the systems architecture to support this OA.

Fiscal resources were provided in early May 2001 to develop and demonstrate this concept during DCX Phase II in October 2001. BCOTM became one of the Army's priority-study issues for DCX II.

DCX II demonstration goal

DCX II's goal was to use a surrogate light-armored, mobile-capability platform that exploited horizontal technology integration to demonstrate a concept for BCOTM and C2OTM by brigade commanders and division command groups. The concept potentially could:

- Apply to legacy-force division, brigade and interim brigade and division commanders;
- Be an early-entry C2 capability;
- Be in the objective force; and
- Provide insights on light-weight, multifunctional alternatives to TAC CP configurations.

Concept development

Initially the Armor Center developed the BCOTM O&O concept based on DCX I insights, emerging doctrinal concepts, battle-lab experiments, strike-force lessons-learned, interim BCT development, 4th Infantry Division's tactical standing operating procedures and specific guidance from TRADOC's senior leadership. In concert with doctrinal developers from the Combined Arms Center at Fort Leavenworth, Kan., the Armor Center's Directorate of Force Development provided a draft O&O to material developers and 4th Infantry Division that became the baseline for the concept-validation demonstration during DCX II.

The next "deliverable" was the OA – an effort guided by the Armor Center's deputy commanding general – which provided a clearer definition of what functions and tasks a commander and his operations group should perform vs. which ones the various CPs (TAC, TOC, forward, main, etc.) should conduct. The OA determined which critical capabilities and functions should be performed on command platforms:

- Display the common operational picture;
- Direct and control maneuver operations (air and ground);
- Control direct / indirect fires and effects;
- Monitor enemy / intelligence activities;
- Synchronize forces;
- Direct reconnaissance / counter-reconnaissance operations;
- Execute and issue orders;
- Receive / render reports; and
- Articulate on-the-move vs. short-halt tasks.

The OA also identified which functions and tasks were to remain delegated to CPs. Following this OA and task analysis, the combat developer needed to provide the material developer with a clear understanding of the requirement based on operational capabilities for command-group platforms.

Following OA development, there needed to be a blueprint for the material solution, and that was the systems architecture. The systems architecture had to adequately address the desired capabilities in meeting the O&O's tenets. The systems architecture is the blueprint for the material solution of the required equipment and its network. The BCOTM's systems architecture provided on-the-move communications, frequency-modulation voice, FM data (high rate), position location, satellite communications, ultra-high frequency (for ground-air coordination), situation-awareness displays, multiple processors and multiple battlefield-functional-area applications (FBCB2, Maneuver-Control System, All-Source Analysis System, Advanced Field-Artillery Tactical-Data System and Air and Missile Defense Workstation).

Team concept

Once the systems architecture was completed, the Armor Center defined roles and missions for the "team of teams." This integrated "team of teams" had the daunting challenge of producing a pair of identically configured commander's platforms in less than two months. The teams consisted of TRADOC and the Armor Center's DFD as the overall-lead combat developer; the ultimate user, 4th Infantry Division, provided input. The combat developer made final determination on what equipment was installed on the platform.

A team that was part of the "team of teams," Team Monmouth, consisted of Communications-Electronics Command's research, development and engineering center and the program executive office for command, control and communications systems. These subject-matter experts provided the latest technology and technical connectivity inside and outside the platform for communications and computer-based display systems. PEO-C3S was also responsible for platform integration and delegated this mission to Lockheed-Martin, the project manager for TOCs and the project manager for platforms.

The Tank and Automotive Armaments Command and TACOM's RDEC, with assistance from General Dynamic Land Systems, provided the technical expertise for the platform and power configuration.

The team's first and most difficult task was to rapidly acquire

the surrogate vehicles in which to integrate the C2 and communications suite according to the systems architecture. TACOM, with TRADOC's assistance, was able to obtain two vehicles which already been produced, procured and in a Defense Department agency's possession. The timeliness and cost-avoidance of borrowing DoD-owned equipment greatly aided the Armor Center's ability to meet the demanding time schedule. The surrogate light-armored wheeled vehicle used in the BCOTM concept-validation demonstration was the 6x6 Pandur, produced in Austria.

The BCOTM platform's design was a concept-based, user-guided program that had a multifocus axis, but the program produced vehicles on time and under budget. The capabilities provided by this communications suite – which can be tailored to unit, echelon and mission – will give multiple command groups the ability to sustain situation awareness and provide command presence in areas of greatest importance.

One key point is that these platforms aren't an additional CP and can't support 24-hour operations. The platform's operations-group staff is small and intended only to support the commander's immediate needs for sustained information that will allow him to "see, decide and act." Traditional tasks such as planning, synchronizing and controlling the battle will still remain with the main and TAC CPs.

The technology used in BCOTM isn't totally new; it has been used in several other venues. The Army once had a program called the C2 vehicle that consisted of a C2 module mounted on a Multiple-Launch Rocket System chassis. The C2 vehicle provided highly mobile communications equipment for the maneuver brigade and battalion CPs. The C2V program was cancelled in late 1999 as the Army transitioned to a lighter, deployable and more lethal force.

The Army Airborne C2 System is another Army program that includes similar equipment and capabilities as the BCOTM platform, except that A2C2S is installed in a UH-60 helicopter.

Key technologies

The most promising technological inserts for the BCOTM program stem from the A2C2S program. This technology could provide lightweight, multifunctional alternatives for a number of TAC CP configurations as well as multiple combat and combat-support vehicles. Technological inserts include the multiprocessor unit and the keyboard-video-mouse switch unit.

The MPU is ideally suited for ground and air platforms as well as for CPs that require fusion and display of BFA computer systems' software systems (when the software is of mixed vintage and the computers have different operating systems). The MPU provides a versatile, configurable platform that consolidates up to six powerful single-board computer modules in a single chassis.

The KVMU allows the software that the MPU "houses" to be quickly transferred to and displayed on any screen or workstation. These screens and workstations may be mounted on a platform or contained in a CP.

Coupled together, the MPU and KVMU technologies enabled us to install many more capabilities onto a small, mobile platform than most Armor Center team members could envision at the start of our project design. Prudent application of these and other technologies clearly show potential in reducing the size and footprint of CPs as well as other possible venues.

Platform integration

CECOM sent its safety, communications and equipment-integration engineers to Fort Hood's New Equipment Fielding Facility to work directly with PM-Platform's installation team. This teamwork would help ensure optimal solutions for integrating mission equipment. User requirements for a time schedule, safety features, crew configuration, limited space and cosite-interference minimization were among the many challenges in integrating these platforms before the deadline of Aug. 3, 2001.

Also, completing the demonstration vehicles by this date was necessary so the crews could have enough time to train with various 4th Infantry Division headquarters elements. Safety engineers from TACOM, CECOM and the Armor Center joined the team at Fort Hood to assist platform integrators in meeting safety-certification standards before issuing the vehicles to soldiers for training. From operational-concept development through safety release, having a small group of knowledgeable and empowered team members from both the combat- and material-development communities confirmed that the "team of teams" approach is one of the best methods for mission success.

Training

Despite the constraint of very little time between DCX Phases I and II (less than six months), 4th Infantry Division's commander, MG Ben Griffin, embraced our efforts. Griffin was extremely supportive in integrating our late-breaking demonstration into the train-up for and execution of 4th Infantry Division's Battle-Command Training Program warfighter exercise. He clearly recognized the opportunity to address a known shortfall in the force and provided our project team all the assistance we needed in achieving our goals and objectives.

The 4th Infantry Division chose to employ the BCOTM platforms at division level and requested TRADOC's assistance in training crews to properly employ the systems that would support the division's command group. Five quality "Iron Horse" soldiers were assigned to each platform supporting the commanding general and assistant division commander for maneuver. Three battle-staff officers or noncommissioned officers and two soldiers (primary and alternate drivers) became the operations group for each platform. The officers and NCOs – known as battle cap-

tains – assumed responsibilities in three functional areas: maneuver, intelligence and "effects." These soldiers immersed in an intensive program for seven weeks, attempting to become qualified and highly trained multifunctional staff officers. Each battle captain became proficient in operating more than BFACs.

A three-phased training approach before the platforms were employed during DCX II began in early July 2001, with the crewmen receiving extensive training on the capabilities, maintenance and operation of the platform and its unique equipment. The 4th Infantry Division's assigned crewmen received hands-on training in using the field-power unit and environmental-control unit. The training's second phase covered operating Army Battle-Command System equipment and platform-unique communications equipment; MPU and KVMU; and the AN / VRC-83 high-frequency radio. The final phase of training taught crewmen how to employ the BCOTM platform and its communications package supporting the commander's requirements.

The Armor Center contracted several digital SMEs who had a wealth of experience in brigade-level operations to train the crewmen.

Cross-axis applicability

As I said earlier about DCX II's demonstration goal, TRADOC's mission guidance required the Armor Center to identify key features that could be applied to all three Army transformation axes. Early observations from SMEs and field commanders suggested it was impractical to design and procure a new platform to house the BCOTM communications suite. As appropriate, the demonstrated systems architecture should be integrated into the TOE documented or programmed platform for each unit.

Legacy-force mechanized-maneuver commanders unanimously said they didn't want a wheeled command vehicle because of its lack of armament, extraordinary silhouette and enemy-target susceptibility. They agreed with the concept of the Bradley fighting vehicle as their preferred BCOTM platform. For the interim force, it's recommended that a BCOTM-like systems architecture be integrated into the interim armored vehicle's command variant as quickly as possible to affect fielding of follow-on IBCT equipment.

Conclusion

Leveraging insights and findings from major events – such as advanced warfighting experiments and capstone exercises – into solutions enabling warfighters to dominate the future battlefield is a difficult but critical task the combat developer must accomplish for our operational forces. Validation of the BCOTM concept is gaining momentum daily. Continually refining the O&O, capturing and documenting revised operational requirements, and using rapid prototyping and spiral development will carry the BCOTM initiative well on its way to meeting the Army chief of staff's vision of transformation as we change the way commanders fight and lead in battle. BCOTM efforts through DCX II and beyond will provide a baseline of emerging requirements for brigade and division commanders' platforms, with more refinement by echelon and transformation axis likely to follow.

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Acronym QuickScan

A2C2S – Army Airborne Command-and-Control System
ATCCS – Army Tactical Command-and-Control System
BCOTM – battle command on-the-move
BCT – brigade combat team
BFA – battlefield functional area
BFAC – battlefield-functional-area computer
C2 – command and control
C2OTM – command and control on-the-move
C2V – command-and-control vehicle
CECOM – Communications-Electronics Command
CP – command post
DCX – division capstone exercise
DFD – Directorate of Force Development
DoD – Department of Defense
FBCB2 – Force XXI Battle-Command Brigade and Below (System)
FM – frequency modulation
IBCT – interim brigade combat team
KVMU – keyboard-video-mouse (switch) unit
MPU – multiprocessor unit
NCO – noncommissioned officer
NTC – National Training Center
OA – operational architecture
O&O – operational and organizational (concept)
PEO-C3S – program executive office(r) for command, control and communications systems
PM – project manager
RDEC – research, development and engineering center
SME – subject-matter expert
TAC CP – tactical command post
TACOM – Tank and Automotive Armaments Command
TOC – tactical-operations center
TOE – table of organization and equipment
TRADOC – Training and Doctrine Command

Observations on the interim brigade combat team and Force XXI Battle-Command Brigade-and-Below System

by CPT Jeffrey Saeli

This article is based on a study I did at Fort Lewis, Wash., of the interim brigade combat team and Force XXI Battle-Command Brigade-and-Below information system. My duties as a data collector included observing and commenting on the IBCT's doctrine and tactics and the FBCB2's efficacy and integration.

I draw my conclusions from directly observing the IBCT and FBCB2, and discussing them with leaders and operators at levels from battalion commander down to the soldier. Also, my military experience and civilian education, viewed as a whole, provide me with a solid background for evaluating how advanced information systems are incorporated into a military force at battalion / brigade level and below.

I agree with the senior Army leadership on the need for a major force revision in light of emerging geopolitical realities: global American military dominance, emergence of asymmetric threats, absence of a regional conventional threat capable of force projection, continued democratization of the globe, an established global economy, an established global media presence and the United States' contemporary role as an overseas political leader.

We need a significantly restructured force, tailored to meet emerging threats, and comprising the elements of deployability, lethality, restraint and an ability – and willingness – to execute diverse and extended operations in environments ranging from "peacekeeping" and similar operations-other-than-war to major theater war. The IBCT is the nascent expression of this realization; integrating such a force into the larger, contemporary Army is the goal of the ongoing effort at Fort Lewis.

With this goal in mind, we must realize the IBCT's mission requirements must be carefully focused. Fielding a successful, effective force with a definitive mission-essential task list requires changes to both doctrine and modified tables of organization and equipment. Concurrent with developing this force is the effort to integrate an advanced information system. Either task would be difficult alone; attempting them together requires close analysis of each competing effort and of the synergistic effect of simultaneous development.

Capabilities, limitations and emerging concepts

The IBCT accepts risk through decreased survivability by reducing armor protection and firepower in its proposed principal weapons platform, the light-armored vehicle with a 105mm main gun. This risk is mitigated by doctrinal recognition of a need to augment the IBCT with more robust, conventional armored forces at the high end of the conflict spectrum. Other mitigating factors are the situation awareness FBCB2 provides as an integrated command-and-control platform for collection and dissemination of intelligence, rapid identification and reaction to enemy threats, and enhanced integration of supporting forces at all levels.

CAPABILITIES. The IBCT and FBCB2 provide the commander with a robust force structure, well equipped to meet a variety of threats. Company commanders have significant assets under their direct control: sniper teams equipped with both .50 caliber and 7.62mm rifles, multiple-caliber mortar systems (120mm, 81mm and 60mm), mounted infantry platoons made up of robust rifle squads and weapons squads, integrated sharpshooters and designated Javelin gunners, and a mobile-gun-system platoon.

This "arms room" concept allows the commander to select force levels and weapons appropriate to the mission, and also to task-organize his individual platoons and provide them with enough firepower to operate independently in a diverse and extended environment. The FBCB2 provides the C2 necessary for individual platoons to conduct dissimilar missions at the same time in geographically separated areas.

Further, a high level of mobility, situation awareness, enhanced target acquisition and improved fire-control measures give unusual agility to the company commander operating independently within the higher commander's intent.

LIMITATIONS. A high level of training covering a broad spectrum of missions is necessary to ensure this force can perform all its intended roles effectively. A METL will be difficult to develop; the risk is an unmanageable level of assigned tasks and not enough time to train on all of them. This is inherent in the IBCT's role as a full-spectrum force, prepared for quick insertion into any environment with little notice.

The current FBCB2 system is nearly useless once operations have begun. Conventional analog systems accomplish most communications

after the line of departure is crossed. Some commanders have mitigated this by tasking the executive officer to conduct real-time battle tracking and reporting through the FBCB2 while the commander, mounted or dismounted, conducts the fight. Synchronization becomes a shared duty.

Increased agility and decision-making will be required of leaders at all levels. Current service-school programs of instruction don't teach these skills in enough depth.

Communications are an essential component of distributed operations. For dispersed units, the disruption of communications is a significant vulnerability.

Service and support for geographically isolated forces are more difficult, particularly for mounted forces.

If it's to operate effectively, this force requires an enhanced information-systems management capability. The current MTOE tasks leaders to be the FBCB2's principal operators, which becomes problematic during dismounted operations.

EMERGING CONCEPTS. The IBCT is emerging as a multifunctional team that retains lethality as a *capability* but not as its principal purpose, except in MTW. Commanders are proving imaginative in the use of restraint and invitations to negotiate or surrender, followed by the application of an appropriate level of force, and should be encouraged. This added consideration will, of course, recognize the presence of civilians on the battlefield and their likely effect on operations.

- Commanders also show initiative in using the FBCB2 to execute battle command and situation awareness, rapidly distributing intelligence and force disposition (friendly and enemy) to the lowest possible level.
- The complex nature of distributed operations has led some commanders to conclude that a company needs a robust tactical-operations center in a parallel battle-tracking role.
- Some commanders have discussed the need for an assistant platoon leader, perhaps a warrant officer, to provide positive control of mounted assets while the platoon leader and platoon sergeant fill traditional dismounted roles. This individual would also serve as the platoon's principal FBCB2 administrator.
- Commanders recognize the need for forward observers at the platoon level.

Technical considerations

The FBCB2 is a fundamentally sound concept that seeks to incorporate advanced information systems into a conventional military force to enhance C2. It's important to remember in the discussion that follows that the FBCB2 in its current form is a prototype system. Flaws are to be expected. Indeed, the developmental phase of any information system involves identifying the strengths and weaknesses of the proposed system, followed by more modification and testing. User feedback and subsequent modification are a fundamental part of information-system design. Early frustration with a developing system mustn't lead to a belief the system can't function as desired.

Three issues immediately present themselves when evaluating the FBCB2 independently of its role in combat and OOTW operations: interface, bandwidth and throughput, and system limitations / transition from digital to analog.

BANDWIDTH AND THROUGHPUT. The military services are allocated a finite slice of the available electromagnetic spectrum in which to conduct information operations. Any bandwidth assigned to the FBCB2 in its role as a data-transmission system limits the bandwidth available for conventional, analog (radio) communications. The same is true in reverse.

Currently, such limited access to the spectrum manifests itself as a slow throughput time for relatively small data packets (25 minutes for one page of text is one example) transmitted through the FBCB2. To achieve the FBCB2's full efficacy, the Army must remedy this shortfall without significantly compromising current analog capabilities.

It's possible that spread-spectrum, frequency-hop technology will moderate this drawback, particularly if shared frequency use through digital timing and encoding allows simultaneous transmission of multiple data over a limited spectrum. This technical question must be resolved in such a manner as to allow the seamless integration of digital and analog communications over a limited spectrum with full transparency to the end-user.

Currently the FBCB2 functions well in combat-support and combat-service-support environments. Such uses are not as time-sensitive as communication in a close battle environment. Conventional analog systems accomplish most communications beyond the LD.

This fact has broader implications than may seem evident. First, an antagonist with even limited means of electronic surveillance may be able to interpret the rise in analog communications as an indication that operations are imminent. This presents a challenge to the doctrinal requirement for surprise in offensive operations. Second, if the system is developed in such a way as to permit the FBCB2's continuous use by a stay-behind operator while the commander and key leaders conduct the battle using conventional means, the principle of unity of command may be violated.

INTERFACE. The current system consists of a mix of pull-down menus, text-entry boxes and Graphical User Interface icons. Not all force components need all elements of the FBCB2 interface at all times.

CSS functions, for example, don't need an interface as intuitive as those proposed for execution in a close battle environment. Such functions, and CSS conditions, generally enable the user to spend more time preparing and editing messages than is possible under conditions involving imminent or actual enemy contact. In the latter case, such messages must require only seconds to execute if they are to successfully replace analog transmis-

sions.

Certain transmissions of the latter type, if properly interfaced with the user, improve the responsiveness of CS assets. For example, if the fire-support officer wanted to process a call for fire and he was presented a set of point-and-click icons representing mission type (troops in the open, vehicles, etc.) – and he had the ability to select the target grid with the click of a mouse on the digital overlay – then a call for fire could be accomplished in three mouse clicks. One click would select target type, one would select the grid, and the third would send the request. Since the location of the requestor and all associated elements is known through Global Positioning System technology, the call-for-fire's elements can be instantly formatted, and fires can be cleared much faster than by conventional means.

A similar case can be made for reporting certain battlefield conditions. Obstacle types could be selected from a set of icons, the grid (or trace) indicated with a click of the mouse, and the information sent simultaneously to all elements with graphics immediately updated across the brigade.

Certain other conditions apply:

- Text boxes don't currently allow the user to view an entire page of text without obscuring the digital map. Users must be able to select window size and location.
- One of the commander's major advantages is visual situation awareness through real-time update of element (vehicle) positions. A real time "chat box" would also be useful, providing a second communications channel in the event analog communications jammed.
- Finally, icon size on the screen is a current concern of users. Most icons are larger than surrounding terrain features; magnification of the digital map to overcome this often results in a screen that shows no more than the commander can see by stepping outside his vehicle and taking a look around.

In summary, a more intuitive, more responsive and more limited interface is necessary to realize FBCB2's full potential.

System limitations and transition from digital to analog. At some point, it becomes necessary for the commander and subordinate leaders to dismount. This takes the leaders away from the digital interface FBCB2 offers, and they must use analog systems. Two issues are paramount. First, how do we doctrinally determine the time, conditions or method of transitioning from digital to analog communications? Second, if we leave behind an FBCB2 operator, how do we avoid diluting unity of command?

The way mechanized units operate may offer a partial solution. Key leaders (executive officer, first sergeant) can remain behind with the vehicles and help the commander execute the battle by way of concurrent analog communications. When the FBCB2 is distributed to the platoon and squad levels, this becomes problematic. A second solution is to offer the dismounted leader a partial interface, a portable screen that provides graphics and element locations, but doesn't require feedback from the operator. This maintains situation awareness for the leader; analog communications provide the means to instruct stay-behind FBCB2 operators.

Further, the real-time GPS uplinks key leaders carry – which provide center-of-mass locations for their respective elements – will enhance both C2 and situation awareness. This is analogous to 18th and 19th century commanders observing the disposition of forces on the battlefield by means of unit colors.

In conclusion, the FBCB2's principal limitation lies in the dismounted leader's ability to provide feedback. Time constraints and interface don't allow effective transmission of information, only its receipt. Given time, voice-recognition software may provide a solution to this; in the interim, doctrine must deliberately address leaders' actions upon isolation from the FBCB2. Such doctrine may place specific constraints and requirements on any dismounted leaders and stay-behind FBCB2 operator.

Doctrinal considerations

MTOE. Yet unaddressed is the issue of who will be the FBCB2's principal operator. It's simply not possible to give this responsibility to the traditional operators of analog information systems: leaders, radiotelephone operators, drivers. First, such soldiers often lack the training and skills (such as typing) necessary to be effective operators. Second, such soldiers already have an important and demanding set of duties to accomplish, particularly in a close battle environment.

Also at issue is the question of administering the overall systems. Organizations that use information systems as an integral part of their operations normally maintain a cadre of technical professionals to maintain and administer their systems. Nominally, such cadres may include systems administrators, programmers, technicians and operators. Such cadres ensure proper functioning of the system for end-users. No such parallel structure exists within the IBCT's organization. This is, in my opinion, a grave oversight.

Information systems aren't the same as weapon systems. Timely evacuation to a support organization for maintenance isn't possible, given most information systems' complexity. Combat leaders lack the training and requisite time to maintain an integrated information system's functionality under combat conditions. The FBCB2's deep integration into the IBCT's C2 structure worsens the effects of this limitation.

To successfully integrate an information system such as the FBCB2 into any force structure and doctrine, we must come to terms with the legitimacy and inevitability of the need for a technical component of the force tasked with operating and maintaining the unit's systems. This force component won't include "combat troops" in the accepted sense. Nonetheless, such a force component must have an

inherent understanding of the trigger-puller's combat functions and requirements. Such a component may be recruited as technical professionals or warrant officers from among the combat-arms force at large, or, alternatively, it may be developed independently through specialized, focused training.

A typical force component would include a systems administrator and programmers at battalion level, as well as technicians and operators distributed throughout subordinate units. The successful integration of advanced information systems into a combat force requires acceptance of this concept, no matter how unpalatable it may be to traditionalists.

The precedent for this is evident in the blurring of lines between rear, close and deep operations and their participants.

TACTICS, TECHNIQUES AND PROCEDURES. Current doctrine provides commanders with adequate guidance in the form of rules of engagement, operations orders and standing operating procedures. Lacking is a definitive set of tasks, and the methods by which to accomplish them, oriented toward a force that must rapidly move between OOTW and MTW operations. The agility to make this transition rapidly from OOTW to a limited, distributed combat focus isn't defined in current doctrine. Indeed, it may be necessary to define a narrower role for the IBCT.

The capabilities necessary for a force to effectively execute combat operations and those of a force to successfully execute OOTW operations may not be found in one force structure. Instead, it may be necessary to define complementary forces, each with a definitive mission, and the ability to conduct a seamless battle hand-off at the point of transition from OOTW to combat operations. Since well-established doctrine exists for traditional combat force structures, my comments here will be limited to the organization and capabilities of an OOTW-oriented force.

The IBCT is a response to a changing geopolitical environment. Inherent in its conception is an awareness of the need for a force that can quickly and effectively respond to non-mature threats involving large numbers of civilians intermingled with combatants in an urban environment. Accordingly, this force should contain elements necessary to perform its principally OOTW-oriented focus while maintaining enough combat power to defeat (offensively or defensively) a conventional threat for a certain time period.

This force must contain the elements necessary to provide police functions, basic engineering, civil-affairs administration, medical services, sustainment services and third-party combatant neutralization. At the same time, it must retain the lethality to conduct limited offensive and defensive operations supporting force-protection and contingency operations, predicated upon its relief or augmentation by a more robust, strictly combat-oriented force.

This force could serve as a pre-combat or a post-combat force, able to execute civil missions in a hostile environment that doesn't involve unrestrained combat. In a pre-combat role, this force would serve as a presence intended to forestall combat, gather intelligence and possibly serve as a security or isolating force while appropriate forces carry out surgical raids. Upon initiation of broader hostilities, the force must be able to protect itself long enough to allow the theater employment of more robust combat forces. In a post-combat role, this force would assume the previously mentioned functions following cessation of broader hostilities.

What seems certain is that integrating all these functions into one force poses obstacles. Combat forces are trained for combat and are ill-suited to non-combat missions in a complex environment. The reverse is often true as well.

An example is the ease of a raid an IBCT company conducted. The raid's objective was to capture a general officer of the opposing force (militia-style regulars) who was reported to be in town for a meeting. The OPFOR was hostile to the company and antagonistic toward a part of the town's population (based on ethnic derivation). The company was required to raid the town under these conditions and capture the general.

The commander initiated the raid with mortar fire, which killed the target and wounded a number of civilians. (The mortar fire was intended to fall behind the town as an isolating element). Further, realizing the attack's source, the OPFOR killed a number of civilians in retribution. The event culminated in a full-scale attack by the company, brilliantly and effectively executed except for the unintended effects of destroying part of the town as well as killing and wounding of a large number of non-combatants due to the level of lethality the IBCT company employed.

Clearly, this isn't the goal of American OOTW. Just as clearly, the kind of "surgical" operation required of the company was beyond its means and training.

As an alternate solution, such a company might play a supporting role: intelligence gathering; isolating the objective to allow surgical assets such as Delta Force to execute the raid; and subsequent control of the situation through psychological operations, show of force and area presence to maintain goodwill and prevent both a larger conflict and large-scale destruction of civilian infrastructure and civilian casualties inflicted by an angered OPFOR.

Another commander chose to surround the town and offer the enemy an opportunity to surrender. When the offer wasn't accepted, the commander initiated a raid with significant firepower and defeated the enemy forces. Again, the raid was well planned and executed, but the invitation to surrender gave the general an opportunity to escape and resulted in significant damage and civilian casualties.

The advantage of the second approach lies in its impact on subsequent operations: enemy forces

might more quickly accept opportunities to surrender. Either approach, however, is likely to reduce goodwill toward U.S. combat forces if lethality isn't balanced with restraint and its effects more precisely targeted.

All this requires a fundamental change in our approach to force development and employment. The IBCT mustn't become a traditional, mounted infantry force with a combat-focused METL and the capabilities of advanced information systems.

In its place, the Army must develop a force capable of dealing with the complexities involved in distributed OOTW and concurrent – though limited – combat operations. This force must be able to mount a significant offensive / defensive response to an increased threat in the short term.

Force application and the IBCT's role

The integration of advanced information-system technology is independent of the nature of any newly developed force. The IBCT provides a platform to develop a new force structure and a platform to develop and integrate a new technology. Defining the IBCT's role in the transformed Army requires that we consider each aspect separately.

There's no inherent tie between the application of force to achieve political ends and the technological means of applying such force at the company and platoon level. The IBCT seeks to combine these two goals. The result is a skewed perception, not only of the IBCT's role but also of the FBCB2 as it relates to broader integration in the force at large.

My recommendation is to continue using the IBCT to develop both a new force and a new information system compatible with all force components, but at the same time to recognize that the two aren't contingent upon each other. I recommend independent IBCT and FBCB2 development.

This isn't the stated goal of senior officers responsible for fielding the IBCT / FBCB2. However, recognizing the need for a functional FBCB2 as a necessary component of the IBCT doesn't mean that parallel development of the FBCB2 must occur at the user level, simultaneously with development of tactics at company level.

Synchronizing proposed refinements to the FBCB2 with full fielding to all the IBCT's components, concurrently with fielding the IBCT's equipment, offers a better opportunity for success than imposing a partial fielding that limits capabilities. In the interim, while FBCB2 development continues, forces should be trained on those specific tasks executed at platoon level and below.

The FBCB2 and the IBCT aren't ready for full-scale, integrated, distributed operations at company and battalion levels. By their very nature, such operations require a functioning FBCB2 and the actual weapons platforms instead of surrogates. Once we resolve the many issues arising from a restructuring of this magnitude, however, we'll be better able to respond credibly and effectively to the challenges that will inevitably confront us.

CPT Saeli was commissioned in 1994 after serving as a rifle-team leader and squad leader in 82d Airborne Division and 25th Infantry Division, and previously serving in 2d Marine Regiment. After he was commissioned, he served as an infantry-rifle-platoon leader, company executive officer and headquarters/headquarters company executive officer with 10th Mountain Division. He holds a degree in information-systems management.

*This article reprinted courtesy of **INFANTRY** magazine, May-August 2000 issue (Vol. 90 No. 2) for Signaleers to read a viewpoint from a combat-arms "user" of information systems.*

ACRONYM QUICKSCAN

C2 – command and control
CS – combat support
CSS – combat service support
FBCB2 – Force XXI Battle-Command Brigade-and-Below (System)
GPS – Global Positioning System
IBCT – interim brigade combat team
LD – line of departure
METL – mission-essential task list
MTOE – modified tables of organization and equipment
MTW – major theater war
OPFOR – opposing force
OOTW – operations other than war

Circuit check

News and trends of interest to the Signal Regiment

News

SIGNAL BRIGADE OPENS COMPUTER-SECURITY CENTER

by SSG Don Smith

FORT GORDON, Ga.– 93d Signal Brigade moved a step toward transformation during a ceremony Nov. 29, 2001.

The ceremony marked the opening of the Southern Command Theater Network-Operations and Security Center as well as activation of the Regional Computer Emergency Response Team-South. These two entities are responsible for computer security and monitoring SOUTHCOM's information network.

"Today is a special day for 93d Signal Brigade and U.S. Army South," said COL Daniel Gerstein, the brigade commander. "(The ceremony is) a move that will provide significant capabilities to the warfighter for computer-network operations and moves the brigade a step toward transformation."

"What a great day at the home of the Regiment – another significant addition to the Regiment's mission capabilities in support of our great Army and joint warfighting forces," said BG James Hylton, Army Signal Command's commander. (93d Signal Brigade is part of Army Signal Command.)

Hylton said the action was significant for several reasons.

He said several Army documents related to transformation place special emphasis on information superiority. The capability to deliver seamless and protected information anywhere is central to achieving and maintaining information superiority.

"The cutting of this ribbon symbolizes not a material separation, but rather the continued expansion of the Army's enterprise network operation and security capabilities," Hylton said. "Mallette Hall, and the advanced technologies therein, is at the forefront of our Army and joint-warfighting network-operation and security capabilities – and in a very real sense, on the perimeter defense of our critical information-management capabilities."

Charles Stephens, a network administrator at the TNOSC, said it's hard to describe the operation there without making it sound complex, but it basically boils down to monitoring the network for maintenance trouble and providing network security. Stephens said a secure system is a challenge to hackers because their motivation is to get into information systems.

"This is real time and it's serious business," Stephens said. He added that about 50 employees are now available around the clock to deal with this serious business.

Mallette Hall is named in honor of LTG Alfred Mallette, who died in 1994. Among other assignments, Mallette commanded 93d Signal Brigade when the unit was located in Ludwigsburg, Germany.

SSG Smith is 93d Signal Brigade's public-affairs noncommissioned officer.

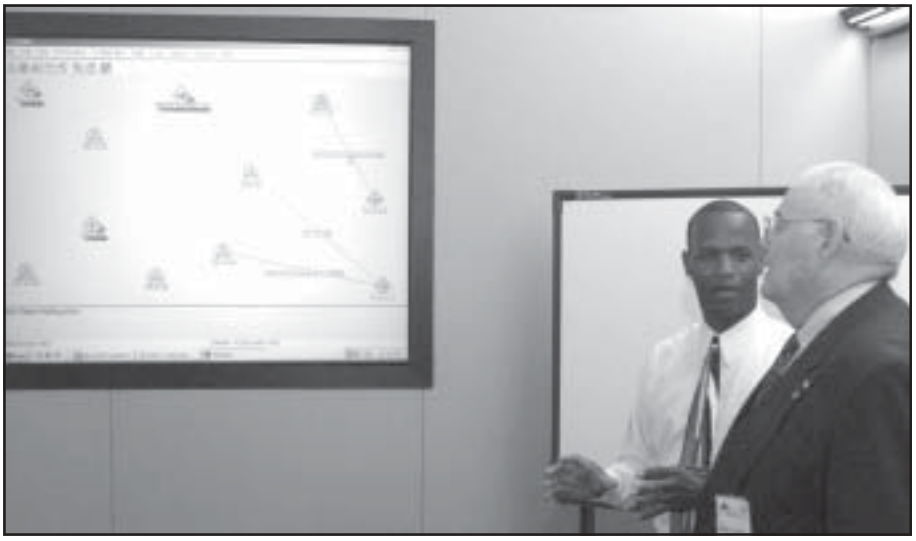


Figure 3. Charles Stephens, a network administrator at 93d Signal Brigade's TNOSC, explains operations to retired LTG Robert Donahue.

STOPLOSS PHASE II BEGINS

WASHINGTON – The Army's assistant secretary recently expanded previously approved and implemented StopLoss authority for the active Army and certain Ready Reserve members. StopLoss Phase II will suspend more officers and enlisted soldiers from separating from the Army if they hold certain additional skills and specialties.

Ready Reserve members affected by StopLoss II includes soldiers serving on Active Guard Reserve status and those on active duty pursuant to the president's call-up of the Reserve under U.S. Code Title 10 12304. The expanded StopLoss authority includes, but isn't limited to, voluntary separation and "refrad" due to a soldier's expiration-of-service-obligation and retirement.

According to a Department of the Army message, the Army's intent is to ensure retention of trained and experienced officers and enlisted soldiers supporting Operations Noble Eagle and Enduring Freedom. The expanded StopLoss authority will generally be under the terms and conditions of Personnel Command's military-personnel message 02-048, the message said.

StopLoss II began Jan. 15. Affected soldiers are those whose established date of separation (discharge, release from the Army, retirement) is on or after Jan. 15 and who are in the categories specified following:

- Active Army commissioned officers with specialty 39. Ready Reserve (Army Reserve and Army National Guard) commissioned officers with specialties 18, 38 or 39. (Active Army, USAR and ARNG commissioned officers who are no longer in these specialties aren't affected by this StopLoss.);
- Ready Reserve (USAR and ARNG) warrant officers with specialty 180A;
- Ready Reserve (USAR) aviation warrant officers with specialties 152C, 153D, 153E, 154C and 154E, and Ready Reserve (ARNG) aviation warrant officers with specialties 153D and 154C;
- Ready Reserve (USAR) warrant officers with additional-skill identifier K4, K5 or K6; and
- Active Army enlisted soldiers with military-occupation specialty 37F and 92M, Ready Reserve (USAR) enlisted soldiers with MOS 18B, 18C, 18D, 18E, 18F, 18Z, 37F, 38A, 67U, 92M and 00Z (Career-Management Field 18 background), and Ready Reserve (ARNG) enlisted soldiers with MOS 18B, 18C, 18D, 18E, 18F, 18Z, 67U, 92M and 00Z (CMF 18 background).

StopLoss doesn't, in most cases, apply to soldiers being processed for involuntary administrative separation for cause, pending action under the Uniform Code of Military Justice, facing mandatory retirement, being processed for discharge / retirement for physical disability or pending separation for the government's convenience.

No new requests for transition leave were to be approved after Dec. 28, 2001, according to the DA message. However, soldiers subject to StopLoss II who began transition leave, shipped household goods, etc., before Dec. 28 will continue to separate / retire / refrad.

Commanders may submit requests for exception to the StopLoss II policy provisions on a case-by-case basis to Personnel Command. These requests must be limited to cases in which the commander considers the soldier's separation to be warranted for compelling, compassionate reasons or to be in the Army's best interest.

FORT GORDON TESTS NEW SIGNAL EQUIPMENT

by SSG Kerensa Hardy

FORT GORDON, Ga. – In the two years since Army Chief of Staff GEN Eric Shinseki announced the concept of brigade combat teams, there has been work Army-wide to make this a reality.

Testing concluded here in November 2001 for the equipment that's an essential communications link to the BCT: the brigade subscriber node.

"BSN is the Army's modular-styled compact switching transmission and nodal control system for BCT," said Harrison Jones III, test officer. In simpler terms, BSN is a radio, switch and router housed in a single shelter that provides the BCT commander with voice, video and data-traffic capabilities.

"Within this system … the brigade can transmit situation-awareness video and high-speed data, as well as voice traffic, within their own network as well as to their higher command," Jones explained.

This integral piece of equipment was established as a direct result of Shinseki's initiative for a medium-sized brigade force that has the capability to deploy at a moment's notice.

"(Shinseki) wanted to be able to transport a combat-capable unit anywhere in the world as quickly as possible," Jones added.

Each BCT has a brigade Signal company within it. BSN is responsible for managing the information network that supports the BCT.

"BSN being organically assigned to that brigade provides an area common-user system for elements of the brigade – it allows them to talk among themselves," Jones said. "The main emphasis for BSN is for the brigade-headquarters-level connectivity."

The BSN concept has been under construction for about 16 months, Jones said. Testing and evaluation and the development of the system went on simultaneously. So, Jones added, the test phase is the culmination of the design, evaluation and planning effort.

BSN's limited-user test was conducted Oct. 29-Nov. 21 by an 80-person team from Operational Test Command at Fort Hood, Texas.

Two other pieces of equipment were tested along with the BSN: battlefield videoteleconferencing and the tactical local-area-network encryptor.

"BVTC provides the picture of the commander's vision to subordinate elements in real time so they can clearly understand his intent," Jones said.

TACLANE supports secure Internet-type connectivity on the battlefield. Jones added that this was the first time OTC tested a piece of communications-security equipment.

Although test results can't be released at this time, each system – at its present state – that was evaluated demonstrated the ability to perform its intended mission. Some modifications will be applied to the systems.

BSN was designed by the Communications-Electronics command in conjunction with the program manager for Warfighter Information Network-Terrestrial. The manufacturers made BSN modular so they could do more with less equipment. Most of it is commercial-off-the-shelf equipment, and some of it is government-furnished equipment.

The Army's goal is to have two BSNs assigned to each BCT. Two BSNs are assigned to 334th Signal Company at Fort Lewis, Wash. Two are at Fort Gordon, and two are being refurbished.

*SSG Hardy is news editor for **The Signal**, Fort Gordon's post newspaper.*

ARMY HEADQUARTERS TRANSFORMING

WASHINGTON – The Department of the Army's headquarters will reorganize, Secretary of the Army Thomas White said Dec. 18, 2001. The secretary announced decisions from a review begun in June 2001 of the organization's structure.

The review's purpose was to streamline decision-making, achieve greater unity of effort within the headquarters, remove unnecessary layers

in the organization and gain greater control over resource management, Army officials said. The effort complements the ongoing Army transformation, the direction of which was reaffirmed since the Sept. 11, 2001, terrorist attacks. The changes will provide a more capable, responsive Army headquarters to address the urgent requirements of the next few years, officials said.

As White explained when he initiated the review in late June, "No successful corporate headquarters in the world today is organized the way we are in Headquarters DA. We currently have two separate staffs, often performing some of the same or similar functions. The level of individual performance and dedication is very high, but we need to ensure those great individual efforts yield the best results. My goal is to reshape the two staffs into a headquarters that maintains civilian oversight and runs much more efficiently."

The realignment of the Army headquarters is part of the Army vision articulated in 1999 to transform the entire Army. Addressing the changes announced Dec. 18, Army Chief of Staff GEN Eric Shinseki said, "This alignment creates a more effective and efficient headquarters and enables us to increase our momentum in achieving the objective force this decade."

A full description of the realignment is in the executive summary on the web at http://www.defenselink.mil/news/Dec2001/d20011217realignment.pdf.

The guiding philosophy behind the assessment is to enhance effectiveness by clearly defining responsibility and authority within functional areas; realigning fragmented organizations; eliminating duplication of effort; incorporating, where appropriate, better-business practices and organizational concepts that have proven successful in major corporations; and optimizing the use of technology.

While performing as a unified staff in executing policy, planning and resource-management responsibilities, the secretariat and Army staff organizations will maintain separate and discrete functions as required by law. However, the organizational changes will facilitate greater collaboration between the secretariat and Army staff by clarifying responsibilities and authorities of each staff and establishing support relationships between elements of the staff.

The secretariat staff will retain responsibility for formulating policy and providing strategic direction, as well as overseeing the execution of Army plans and programs. The Army staff will continue to prepare plans, supervise their execution and coordinate activities Army-wide in support of both Title 10 functions and combatant-command missions.

The secretary of the Army, undersecretary of the Army, chief of staff of the Army and vice chief of staff of the Army will form the Army's executive office, under the secretary's direction. The executive office will provide direction and set priorities for the Army.

Selected senior Army staff principals will advise and assist their counterpart assistant secretaries of the Army to enhance the flow of information and speed decision-making. While working closely with the assistant secretaries, the Army staff principals will continue to support the chief of staff.

The realignment more fully integrates the Army National Guard and Army Reserve into key positions of authority to better accommodate the key issues and concerns of all components within a single integrated staff.

Implementation began in December 2001 and should be complete by September. Military positions eliminated in the process will be redistributed to Army field units; realignments won't reduce Army endstrength. Dollar savings resulting from the elimination of civilian positions will be available to fund priority requirements. The U.S. Army Audit Agency will monitor implementation and maintain an accounting of resource transfers.

The next step, to be accomplished by Spring 2002, was to conduct a similar review of organizations below the Army headquarters level and of those organizations that support the headquarters.

NEW TRANSIT CENTER OPENS AT PENTAGON

WASHINGTON – Metro bus service returned to the Pentagon Dec. 16, 2001, operating from a new Pentagon Transit Center. The larger, brighter and more security-conscious transit center brings regular bus service back to the Pentagon for the first time since Sept. 11, 2001.

Since that date, Pentagon-bound buses have operated from the Pentagon City Metrorail station.

The Pentagon Transit Center, a $36 million project funded by the Defense Department, was designed and planned long before the Sept. 11 terrorist attacks. It's Phase I of security upgrades set for the Pentagon's Metrobus and Metrorail facilities.

Based on security assessments, the Pentagon wanted to increase the distance between buses and the Pentagon as well as eliminate the existing Metro escalator and elevator entry points into the Pentagon. This required relocation of the existing bus terminal. The transit renovation project enhances the security of the Pentagon's Metro entrance by reorganizing the bus arrival, access and circulation areas, including relocation of the bus bays to no closer than 280 feet from the Pentagon itself. The buses picking up and dropping off riders at the old bus terminal had been as close as 10 feet to the building.

Other security upgrades involve the construction of a new Pentagon entrance building and new elevator and canopy at the Metrorail entrance with an expected completion by Fall 2002. Until it's finished, a temporary covered walkway will allow customers to walk from the new transit center to the escalator to enter the Metrorail station.

About 29,000 people a day will use the Pentagon Transit Center, which will have 1,571 bus arrivals and departures each weekday on 84 different bus routes using the center's 24 bus bays.

More information on Pentagon Metro facility renovation is available at http://metro.pentagon.mil/mef/home.htm. Details on Metro bus and rail service may be found at http://

www.wmata.com. An informative brochure on the new Pentagon Transit Center also is available at

http://www.wmata.com/metrobus/pentagon_transit_center.pdf.

RECRUITERS, INTELLIGENCE LEAD DEFENSE DEPARTMENT'S INFORMATION-SYSTEMS MODERNIZATION

WASHINGTON – The Army took top group and individual honors in the first-ever Defense Department Chief Information Officer awards. DoD's CIO, John Stenbit, assistant secretary of defense for command, control, communications and intelligence, recently announced the winners for their contributions to DoD effectiveness.

The Army Recruiting Command's information-support activity and Robert Fecteau, Army Intelligence and Security Command's CIO, were singled out for honors for designing and implementing systems saving U.S. taxpayers millions of dollars.

USAREC fielded a virtual private network, an entirely web-based recruiting data-management system, a national pooled-minutes cell phone contract and a software-development model certification considered state-of-the-art in government circles. All told, the information-support activity was able to save the command roughly $42 million annually.

Fecteau integrated 14 organizations into an effective contracted information-technology operation involving BAE Systems, MITRE and Microsoft. This increased "our ability to identify and understand the scope and breadth of IM / IT costs needed to run the command from an enterprise view and to ensure they are executed," according to Fecteau.

The result was about $10 million savings the first year. Another estimated $8 million was saved through the command's acceleration of contractor security clearances.

One key to CIO success, Fecteau says, is leadership. For "true transformation to take place," top leadership must support the CIO process. Stenbit thinks the other end of the management process is just as important: "Everywhere in DoD are individuals and teams who have put a lot of time and energy developing better tools, weapons and methods for us."

Winners were chosen by senior DoD officials in the CIO community. Other finalists, narrowed from a field of candidates from across DoD, were the Air Force for its portal, the Navy for business-process re-engineering and Cmdr. Wyatt Smith for his IM of the military health system.

UPDATES

ARMY PORTAL ACCOUNT REQUIRED BY OCT. 1, 2001

by Lisa Alley

FORT GORDON, Ga.– Sign-up for an account with Army Knowledge On-line, the Army's worldwide intranet and portal to a soldier's email account as well as to usage of the University of Information Technology here, was required as of Oct. 1, 2001, for soldiers and Department of the Army civilians.

The vision for AKO is "to transform the institutional Army into an Information Age, networked organization that leverages its intellectual capital to better organize, train, equip and maintain a strategic land combat force."

"Whether you realize it or not, AKO is going to become an important part of managing your Army career," wrote MAJ Alan Makowsky, chief of Officer Division, Office Chief of Signal (the Signal personnel proponent), in the Fall 2001 edition of ***Army Communicator***.

According to Makowsky, AKO will eventually be the central repository for Army websites and access to secured information. Personnel Command plans to allow updates to some personnel data via AKO in the near future; soldiers will be able to view their personnel files, including their photos, on-line.

AKO also provides soldiers with an email address that will follow them throughout their Army careers, as well as give them access to AKO's information resources and features. The AKO email account eliminates the need to change a soldier's email address every time he or she makes a permanent-change-of-station move. The account also ensures the soldier's career manager has a current email address to send him or her important information.

Signaleers will also access their advanced career training through the Signal Center's UIT and resource center via their AKO account. (See ***Army Communicator's*** Winter 2001 edition for more information on UIT.)

To sign up for AKO, point your Internet browser to http://www.us.army.mil and select the "I'm a new user" link. Once your account is set up, return to the website and sign in using your user name (firstname.lastname) and case-sensitive password. Some of the features you'll find on the Army portal's homepage are links to personalize content, access web email and newsgroups, locate other soldiers, read Army news, access Army web-based applications and search all Army websites.

Once in the Army portal, go to "Edit personal info" under the "My Army portal" section to set up email forwarding and enter your organizational information into the AKO "white pages." You may use "My channel" to set up mobile bookmarks that will travel with you to any computer you use to log on to AKO.

Link to https://akomail.us.army.mil to access your email inbox by clicking on the "WebMail" tab on the Army portal homepage.

Ms. Alley edits ***Army Communicator***.

RUMSFELD TO BUSH: DON'T VETO BILL OVER BASE CLOSURE

by Jim Garamone

SHANNON, Ireland – Defense Secretary Donald Rumsfeld said Dec. 15, 2001, that he won't recommend President George W. Bush veto the Defense Appropriations Bill over base-closure issues.

"I slept on it, and I'm not going to recommend that it be vetoed," Rumsfeld said aboard the plane dur-

ing a trip to the Caucasus, Central Asia and North Atlantic Treaty Organization headquarters. "Needless to say, I wished (the BRAC round) had been earlier, but it's in (the bill)."

The DoD base-closure proposal, entitled the Efficient Facilities Initiative, called for the base closure process to begin in March 2003. Senate and House members agreed for the process to begin in 2005.

Rumsfeld said the president vetoing the bill would delay important legislation for service members, including a sizeable military pay raise and infrastructure improvements.

Rumsfeld could not hide his disappointment when he discussed the delay in the program. He said DoD will continue to have 20 to 25 percent more bases than it needs. "We'll be spending … taxpayers' money – hard-earned money – that's being wasted to manage and maintain bases we don't need," he said.

"Given the war on terror, we'll be doing something even more egregious, and that is we'll be providing force protection on bases we don't need," Rumsfeld continued. That will be wasting money and assets that could otherwise be used to fight terrorism. "It's a shame," he said.

Mr. Garamone writes for American Forces Press Service.

Leader Transitions

335th Theater Signal Command's top officers nominated for promotion

WASHINGTON – 335th Theater Signal Command's commander and deputy commander were nominated by Secretary of Defense Donald Rumsfeld Dec. 4, 2001, for promotion.

Army Reserve BG Lowell Detamore, 335th's commander, was nominated for major general. USAR COL Roger Ward, 335th's deputy commander, was nominated for promotion to brigadier general.

The 335th Theater Signal Command is located at East Point, Ga., near Atlanta.

Signal Units

Baseband multiplexers improve U.S. communication capabilities during Ulchi Focus Lens exercise

MERRIMACK, N.H. – Codem's TTI-1000 and TTI-500 baseband multiplexers were a main attraction at the annual Ulchi Focus Lens 2001 exercise.

UFL is an annual Republic of Korea-U.S. Combined Forces Command dynamic, simulation-driven command-post exercise. The CPX is designed to provide theater, component commanders, Army corps (and equivalent levels for other services) commanders and staffs with an advanced training environment for improving their command-and-control, staff procedures, decision-making and warfighting skills. The scenario is a two-phase CPX based on a coordinated land, sea and air attack supported by conventional forces.

During the UFL '01 CPX, Codem's baseband multiplexers provided commanders with crucial tactical (secure/non-secure) email, data and voice communications. The baseband multiplexers are designed with the option of remote management, testing and control from any number of local-area-network-connected workstations. This feature made it possible for 1st Signal Brigade to manage networked mulitplexers from a single C2 location during the CPX.

"We took full advantage of the built-in diagnostics of the TTI-500/1000s by using remote workstations to monitor the multiplexer network," said Mark Yamamoto, a Codem representative who worked closely with 1st Signal Brigade during UFL '01. "From the reporting-and-planning terminal workstation, we were able to telnet each multiplexer, enabling all warrant officers with proper passwords to perform tests and make needed configuration changes."

All of Codem's baseband multiplexers' management and control features can be accessed from one location. These features include error-rate history and monitoring of all transmission links; alarm notification of any transmission path exceeding a defined bit-error rate; alarm history with uptime, downtime and date stamps; loopbacks of any individual circuit, digital trunk group or aggregate in either direction; and built-in firebird testing of any data or voice circuit.

These capabilities provided 1st Signal Brigade with a single point of control during UFL, allowing Signaleers to test every DTG, tactical-operations center, transmission system and individual circuit connected to the TTI 500/1000s from a single workstation.

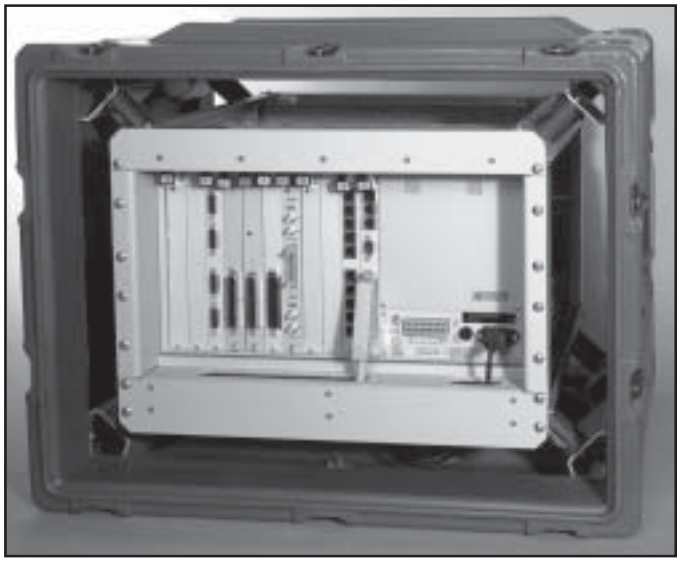


Figure 4. Codem's TTI-1000 baseband multiplexer provided commanders with tactical email, data and voice communications during Ulchi Focus Lens.

Codem Systems Inc. is a leading provider of broadband wireless and wired communication solutions for commercial and government telecommunications customers throughout the world. More information about the company is available on the Internet at www.codem.com.

OF INTEREST

PROTECTING CRITICAL MILITARY INFRASTRUCTURES

by Jim Garamone

ARLINGTON, Va. – Even before Sept. 11, 2001, the Defense Department recognized the importance of protecting critical infrastructures.

For more than two years, experts in the office of the assistant secretary of defense for command, control, communications and intelligence have been working to identify DoD's critical assets and their associated supporting infrastructures; develop policy on their protection; and game how the department would work if a node in these infrastructures was destroyed.

Tom Bozek is director of the Critical Infrastructure Protection Office. He leads a small staff that's putting in place the policy framework for critical-infrastructure protection.

The military has long known certain physical or cyber capabilities are essential to protect the nation. They're also essential to help the military accomplish its missions. Measures can be as mundane as physically protecting a facility or installation to ensuring satellite communications continue uninterrupted. Bozek's office studies the big picture and applies lessons to specific fixes.

"We want to learn the lessons once and implement the solutions many times," Bozek said.

Bozek's office works with the warfighting commands to determine what capabilities are critical to their missions. Then the office works with the service or agency that "owns" the asset to ensure the capability is protected or that procedures are established so the mission continues in the event of a breakdown.

It's a big job. "We're trying to understand what assets are critical to military mission success," Bozek said. The office concentrates on these critical infrastructures: transportation, logistics, financial services, public works, health affairs, personnel, defense information, space and intelligence, surveillance and reconnaissance.

Bozek said the picture is complicated because there are many interrelationships among the various infrastructures. "We know there are interrelationships among the assets in these infrastructures," he said. An asset failure in one infrastructure may have an adverse cascading affect on assets in many other infrastructures.

Once the group defines the interdependencies, it can isolate where the single points of failure may be that would cause mission failures.

The group has built on experience gained during the Year 2000 computer-bug effort. "We're taking advantage of the Y2K experiences. That's a good example of the interdependencies," Bozek said. "You have a variety of information systems that are connected. They pass data to each other through this network. The same is true on physical infrastructures – transportation, logistics, financial services and so on. So, we find the same principles apply to these infrastructures that we learned in Y2K."

The office calls on many different agencies for help. Bozek relies on the Navy's Joint Program Office for Special Technology Countermeasures as the overall technical agent. He also calls on the Defense Threat Reduction Agency for balanced survivability assessments.

In addition, the office works closely with the Homeland Security Division of the Joint Staff, and with all the combat commands, services and combat-support agencies. The office also works with the Federal Bureau of Investigation and the National Infrastructure Protection Center.

The Sept. 11 attacks underscored for the military the need for redundant facilities and partnerships with private industries. The attacks in New York, for example, illustrated the robustness of U.S. telecommunications facilities. Private telecommunications companies – that DoD uses also – reconstituted financial communications networks fairly quickly.

But the attacks illustrated how much the military relies on private firms for infrastructure support. "We are dependent on our private-sector partners," Bozek said. "Our telecom is over private lines, most bases take power from private sources. Private shipping lines augment our sealift and airlift.

"We are developing even closer relationships with our private partners to identify potential vulnerabilities and to get better."

In light of the asymmetrical threats the U.S. military faces, the mission given Bozek's office is never-ending.

"Critical-infrastructure protection has a defensive focus, offense almost always has the advantage," he said. "There are always going to be newer, creative ways adversaries are going to use to try to overcome our defenses. Everyone needs to be vigilant."

Mr. Garamone writes for American Forces Press Service.

ARMY PHYSICAL-READINESS TEST TAGGED FOR CHANGE

WASHINGTON – The Army's time-honored physical-readiness test will see major changes under Field Manual 3-25.20. The new FM is in draft, being staffed for comments and changes in the first quarter of Fiscal Year 2002. After staffing and approval, the FM will become doctrine.

FM 3-25.20 proposes to train Army soldiers for physical readiness according to the Army's nine principles of training contained in FM 25-100. The Army will adopt a new six-event APRT to better assess a soldier's strength, endurance and mobility.

Once FM 3-25.20 is approved, the U.S. Army Physical Fitness School will develop standards based on current and ongoing research. These standards will be implemented at a currently unknown date. However, USAPFS stopped instructing the two-week Master Fitness Trainer Course at the end of Training Year 2001. Instead, a mobile training team will hold a one-week Physical Readiness Training Leader Course as changes in the APRT are made.

The current Army Physical Fitness Test measures how many push-ups a soldier can do in two minutes, how many sit-ups he or she can do in two minutes and how fast he or she can run at a two-mile distance. The three-event test was designed to en-

sure a base level of physical fitness essential for every soldier in the Army, regardless of military-occupation specialty or duty assignment.

One of the advantages of the current test is that it's easy to administer, according to an Army official. Unfortunately, it has formed the foundation of many unit and / or individual training programs, he said.

"APFT performance doesn't relate to a soldier's ability to perform his or her job or to a unit's readiness to perform its mission," said the Army official. "Unit programs then must be designed to raise the level of conditioning to meet or exceed mission-related physical-performance requirements. Commanders must conduct physical-readiness programs that enhance a soldier's ability to complete critical soldier or leader tasks that support the unit's mission-essential task list, not just raise the unit APFT average. Preparation for the APFT is of secondary importance."

The new APRT has a different approach. "The proposed APRT will allow commanders to assess their soldiers' physical capabilities," said the Army official. "Multiple assessments or events are required since a broad range of physical attributes are necessary for optimal soldier performance. Valid assessments must challenge soldier strength, endurance and mobility. To further strengthen validity, the assessments must either predict the ability to perform critical soldier tasks or closely simulate the actual tasks."

The proposed APRT shapes up to this six-event sequence (to which there will be no exceptions):

- Two standing long jumps to measure the soldier's ability to jump horizontally from a stationary position (indicates the soldier's power, especially of the lower extremities);
- One minute's worth of power squats to measure the soldier's ability to perform repeated squats to a precise standard of execution (indicates the soldier's muscular strength, power and endurance of the hips and legs);
- Heel hook for one minute to measure the soldier's ability to secure his or her legs on a bar while free-hanging from the bar with his or her hands (indicates the soldier's trunk strength, mobility, grip strength and endurance);
- 300-yard shuttle run to measure the soldier's ability to sprint after changing direction (indicates the soldier's anaerobic endurance, speed and mobility);
- Push-ups for one minute to measure the soldier's strength, endurance and mobility of the chest, shoulder, triceps and trunk muscles (indicates the soldier's ability to lift his or her body from the ground and maintain stability of the trunk); and
- One-mile run, as fast as the soldier can run, to measure endurance of the soldier's heart, lungs and leg muscles.

All six events must be completed within two hours. No restarts will be allowed. Soldiers will be allowed a minimum of five minutes and a maximum of 10 minutes to rest between events.

WEST POINT ACCEPTING APPLICATIONS

WEST POINT, N.Y. – The U.S. Military Academy here is the world's premier institute of leader development. Graduates not only receive a bachelor of science degree but also a commission as an Army second lieutenant, gaining practical leadership experience that's virtually unmatched in any other profession.

Each year some 250 soldiers (Active, Reserve and National Guard) and more than 100 dependents of military members are offered admission to West Point or the U.S. Military Academy Preparatory School at Fort Monmouth, N.J.

For a dependent to be eligible, he or she must be the son or daughter of a career military member. The term "career military member" refers to members of an armed force (Army, Navy, Air Force, Marines or Coast Guard) who are on active duty (other than for training) and who have served continuously on active duty for at least eight years. The term also includes those who are, or who died while they were, retired with pay or granted retired or retainer pay.

Also included are service members serving in the Reserve Component who are credited with at least eight continuous years of service computed under Section 12733 of Title 10 of the U.S. Code (for example, at least 2,880 points). Finally, Reservists who would be, or who died while they would have been, entitled to retirement pay except for not having attained 60 years of age are also included in this category.

The prep school prepares soldiers for success at West Point through an intensive curriculum focused on English and mathematics. Applicants must be U.S. citizens, unmarried with no legal obligation to support dependents, high-school graduates, under 23 years of age prior to July 1 of the year entering USMA (under 22 years of age prior to July 1 of the year entering the prep school), of high moral character and have a sincere interest in attending West Point and becoming an Army officer.

Soldiers and dependents who meet the basic eligibility requirements, have achieved Scholastic Aptitude Test scores greater than 1,000 or an American College Testing assessment composite score of 20 or higher, and achieved good grades in a college-preparatory high-school curriculum are especially encouraged to apply. All application requirements must be met by April 1 to be considered for an appointment to West Point or USMAPS in July.

Those interested should contact CPT Cliff Hodges at DSN 688-5780 or commercial (845) 938-5780, email tc2324@usma.edu, or fill out the request form at http://forms.admissions.usma.edu/cb.

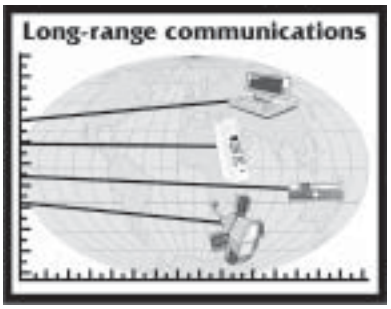
ACRONYM QUICKSCAN

AKO – Army Knowledge On-line
APFT – Army physical-fitness test
APRT – Army physical-readiness test
ARNG – Army National Guard
BCT – brigade combat team
BRAC – base realignment and closure

continued ▸

ACRONYM QUICKSCAN

BSN – brigade subscriber node
BVTC – battlefield videoteleconference(ing)
C2 – command and control
CIO – chief information officer
CMF – career-management field
CPX – command-post exercise
DA – Department of the Army
DoD – Department of Defense
DTG – digital trunk group
FM – field manual
IM – information management
IT – information technology
MOS – military-occupation specialty
OTC – Operational Test Command
SOUTHCOM – Southern Command
TACLANE – tactical local-area-network encryptor
TNOSC – theater network-operations and security center
UFL – Ulchi Focus Lens
UIT – University of Information Technology
USAPFS – U.S. Army Physical Fitness School
USAR – U.S. Army Reserve
USAREC – U.S. Army Recruiting Command
USMA – U.S. Military Academy
USMAPS – U.S. Military Academy Preparatory School
Y2K – Year 2000



Long-range communications at high frequencies

by Edward Farmer

On Dec. 12, 1901, Guglielmo Marconi transmitted the first radio signal across the Atlantic – from Poldu in Cornwall, England, to St. John's, Newfoundland. This feat of scientific achievement succeeded by blind luck – with no knowledge of radio-propagation science, Marconi made a fortunate choice of frequency, and he happened to pick antenna locations and an overwater path that made the most of his kite-lifted vertical antenna.

Radio science has moved a long way since then. The excitement of discovery may be diminished, but we now can plan radio communications with a confidence beyond Marconi's dreams.

There are always two essential factors in high-frequency radio communications: frequency selection and antenna design. Essentially, the frequency used must support propagation over the required distance, and the antenna must radiate enough power at the angle required to make the path.

Nothing absolves the communications planner of addressing these two issues. Automatic link establishment merely automates trying each frequency in a user-selected suite of frequencies, using whatever antenna system is connected. ALE can make the best of a bad situation, but it can also waste a lot of time trying frequencies that can't possibly work. Optimizing link time depends on the user providing a suite of viable frequencies.

Long-range communications requirements

Near-vertical-incidence skywave communication has been thoroughly discussed in ***Army Communicator*** and other technical literature. NVIS is a "one-hop" system (earth-ionosphere-earth). Its effective use requires antennas that predominantly radiate at very high (nearly 90 degrees) angles, along with frequencies low enough to refract from the ionosphere when the angle of their contact with it is nearly 90 degrees. (See my article titled "NVIS propagation at low solar flux indices" in ***Army Communicator***'s Spring 1994 edition for a more complete discussion of critical angle and frequency selection.) It's hard to improve on a dipole-like antenna mounted about 0.15 to 0.3 wavelengths above the ground that uses frequencies between two and 12 megahertz – depending on the time of day, month and position in the 11-year solar cycle.

Long-range communication involves a much different set of requirements. Making a circuit requires several "hops" (reflections involving earth-ionosphere-earth).

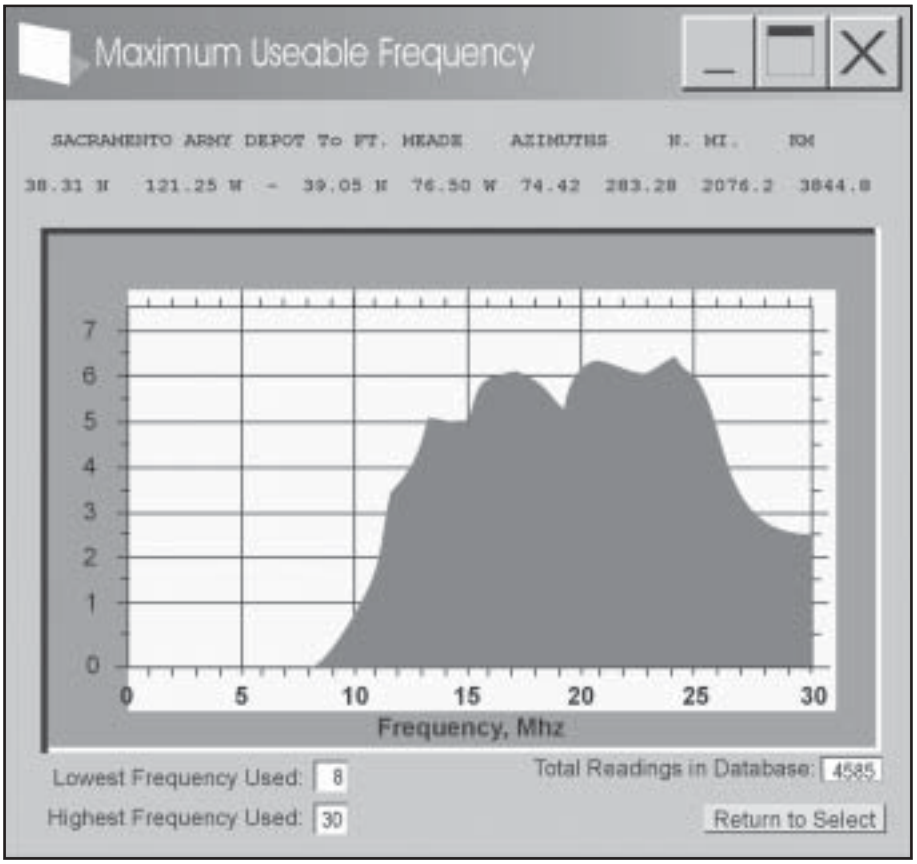


Figure 5. MUF for a path between Sacramento, Calif., and Fort Meade, Md., under all normally occurring conditions. The graph shows the percentage of cases tested at which communication takes place at each frequency in the HF range. If the path were shorter (for example, to Colorado), the frequency suite would shift to the left.

Having as few hops as possible enhances circuit quality. Further, it's often attractive to select a path in which the "earth" portion of the hop takes place over seawater, even if it isn't the "shortest distance between two points." Thus we're concerned with both the "short path" and the "long path" between circuit ends.

In either case, the geometry of these paths requires radiation at lower angles, the exact angle depending largely on the path length. Since radiation at these low angles encounters the ionosphere at shallow angles, much higher frequencies will refract than is the case with NVIS paths. This effect is similar to firing a bullet at a steel plate. If the bullet encounters the plate squarely, it may penetrate, while if the bullet encounters the plate at a grazing angle, most likely it will deflect.

Since we have no control over the ionosphere, there's no choice but to select frequencies based on what it will do for us in any given situation. Long-range communications planning, however, requires circuits that are available a high percentage of the time. This means they need to work during all hours of the day, all months of the year and over the entire range of sunspot numbers. These frequencies are found by running a propagation-prediction program for every possible case.

Propagation programs

While there are quite a few propagation programs available, my approach uses ICEPAC. ICEPAC was developed by Voice of America and is available, without cost, from the National Bureau of Standards. Due to development work done by Dr. Greg Hand and his associates, ICEPAC is among the best point-to-point HF-propagation-prediction software.

To consider each hour of the day, each month of the year and a representative number of sunspot numbers (for example, 0 to 200 at increments of 10), one would have to run ICEPAC thousands of times, then compile and analyze the results. Depending on your computing horsepower and bookkeeping skills, this could take weeks. However, I developed software to automate the process. Figure 5 shows the results of an analysis of the path between Sacramento, Calif., and Fort Meade, Md. I use this path as an example because it's a typical one with typical results. For best confidence, each situation should be specifically analyzed.

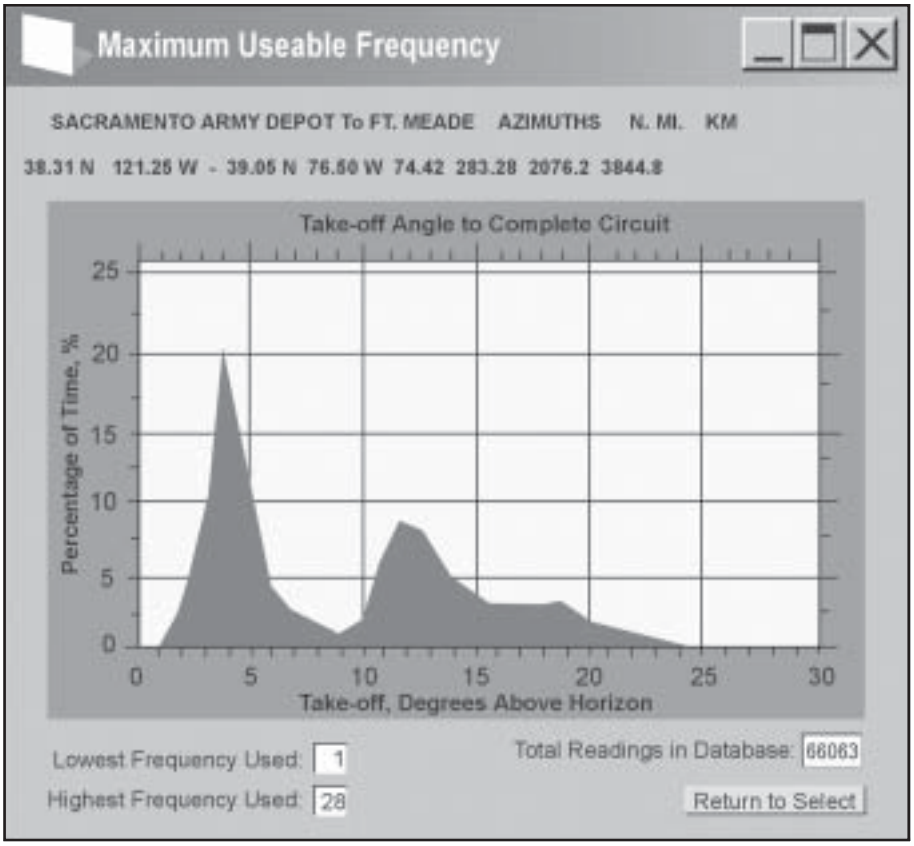


Figure 6. Take-off angles required to complete the circuit over the entire range of possible conditions. Note that for this path, the most important angles are in the vicinity of 4 degrees and 12 degrees. An antenna with a vertical radiation pattern that covers the range of 1 to 28 degrees would be ideal. A shorter path will generally involve greater angles.

Propagation programs report the maximum useable frequency because there's a scientific basis for determining it. The "best frequency" is called the frequency of optimum traffic. The FOT is usually a bit below the MUF; some literature suggests 80 percent of the MUF is a good estimate. In any case, Figure 5 provides a good indication of the range of frequencies that will be useful in making this circuit.

In this case, frequencies below eight mhz are very unlikely to be useable – consequently, asking an ALE system to constantly scan and try them is a waste of time that could be spent actually communicating. Sometimes there's no frequency that can get the job done. Propagation anomalies such as solar flares can eliminate radio propagation for periods of time. Nothing in our present science can overcome these problems.

The "best" frequency under any given set of conditions must be determined by evaluating each specific case. System design, however, needs to define the limits that bound the problem.

Best antennas

Once we know the frequencies, the next task is to determine what take-off angles from our antennas are required to make this circuit. The same computer program that produced Figure 5 was also used to produce Figure 6.

An antenna that concentrates its radiation at low angles (1 to 28 degrees, in this case) and in the specific direction required to reach the circuit's other end would be ideal for this application. This is clearly not your NVIS dipole. Since these requirements are as old as radio, there's quite of bit of science as well as practical experience available.

Probably the "gold standard" for long-range HF is the terminated rhombic antenna. It focuses its radiation in a narrow, low-angle beam. Its geometry can be adjusted to control its take-off angle. Unfortunately, it's very large – several wavelengths long. The size doesn't permit easy reorientation, so versatility is low. Changing frequency can mean changing its size. While it's truly a remarkable antenna, it isn't a practical choice for most missions. A cousin of this antenna, the V-beam, is a practical field-expedient wire antenna that provides good performance for military missions.

Another common antenna is the log periodic dipole array. LPDA is available in "rotateable" versions and in sizes that cover the frequency range most often used for long-range HF communication. These antennas provide good directivity in azimuth and acceptable patterns in elevation. They also have the decided virtue of operating over a wide range of frequencies without any reconfiguration or adjustment.

Figure 7 shows a typical azimuthal pattern for an LPDA. Note the radiation pattern is focused along the antenna's axis.

The main concern is the elevation pattern and the antenna's ability to radiate at low angles. Figure 8 shows this antenna's performance. The shaded area defines the angles important in making the circuit of interest.

The actual pattern of a specific antenna depends heavily on its height above ground and on the electrical properties of the ground under the antenna. For most horizontally polarized antennas, the pattern favors high angles at the expense of low angles as the antenna is lowered toward the ground. A minimum height for good low-angle radiation is one-half wavelength.

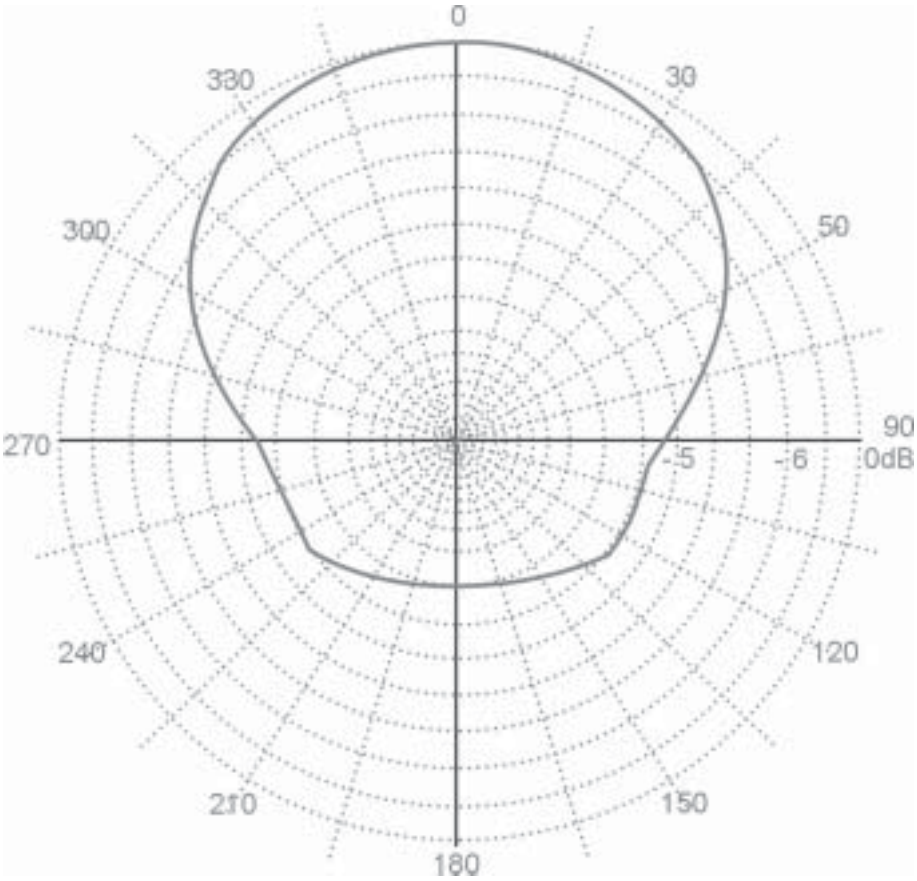


Figure 7. Azimuthal pattern of an LPDA. The gain of an LPDA of any particular design varies with frequency. This particular one is 67 feet long and incorporates 29 elements. Maximum gain is 10.8 dBi or about 8.2 dBd. That means its performance is about 6.6 times better than a dipole at the same height.

There are other antennas suitable for long-range communication; it would be easy to spend an article much longer than this one discussing any one of them. It is, however, instructive to evaluate the simple horizontal dipole and a quarter-wave vertical.

A dipole, such as we use for NVIS effect, loses its overhead radiation and gains lower-angle radiation as it's raised farther above ground. Figure 9 shows the elevation pattern of a dipole mounted at a half-wavelength and at one wavelength above average ground.

Vertical antennas have a reputation for excellent low-angle radiation. This is true only if the antenna installation includes a great many radials or if it's mounted over very conductive ground such as seawater. Figure 10 shows the radiation pattern of a quarter-wave vertical over perfect ground compared with the same vertical over average ground with 12 in-ground radials. A dipole mounted a half-wavelength above average ground is included for reference. (Whenever my discussion is in wavelengths, it's implied that the antenna is designed for a specific frequency or narrow range of frequencies. The antenna will work on other frequencies but may require a tuner. In most cases, performance changes when operation moves from the design frequency.)

A vertical antenna over saltwater is a very good low-angle radiator – probably the best there is. Unfortunately, the farther from seawater, the poorer the performance. There are

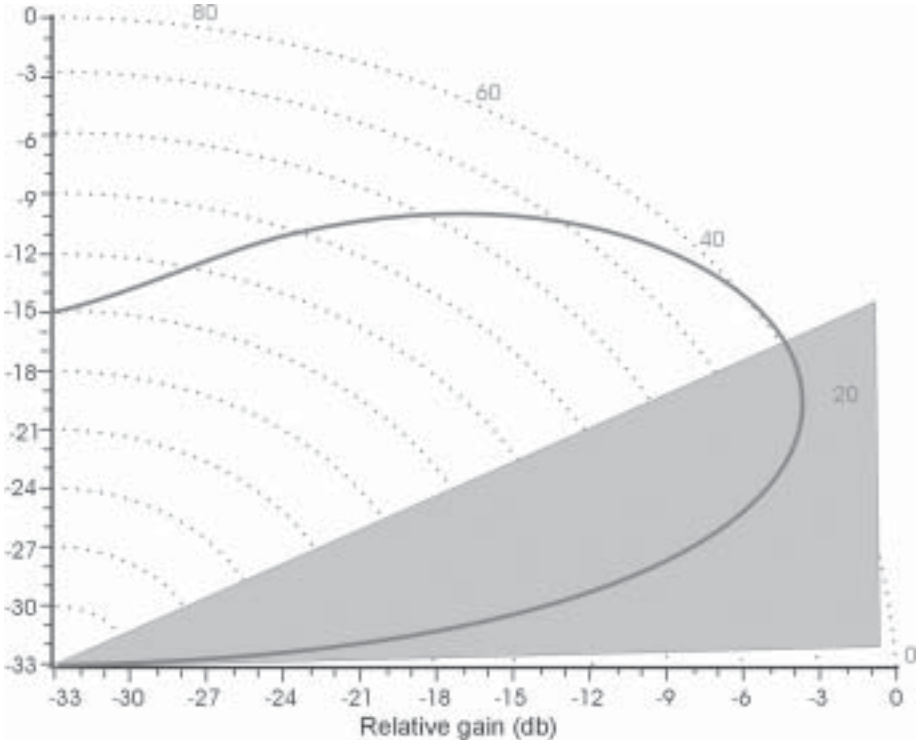


Figure 8. LPDA's elevation pattern with the angles needed for the Sacramento-to-Fort-Meade path shaded. Note that even an antenna as large and well-designed as this one is down about 20 decibels at the lowest angle of interest. A 20-dB reduction in antenna gain is analogous to lowering transmitter power from 100 watts to one watt. This illustrates how little transmitter power is really needed for many paths, but also how difficult it is to get the transmitter's power radiated at the angles we need. A shorter path would involve a similar shaded wedge covering higher angles.

many reasons for this, but the important information here is the somewhat surprising conclusion that a dipole mounted at a half-wavelength will usually outperform a practical vertical at the low angles required for these paths.

Path analysis

As is apparent, selecting the best antenna for the job requires some analysis. I analyzed these antennas using NEC-4, which is freely available to Defense Department entities. The user interface to the NEC computing engine, provided by EZNEC Pro – a commercial product – makes using NEC-4 much simpler and more pleasant. (All the comparison plots in this article are from EZNEC Pro.) Since actually testing HF antennas in a relevant way is pretty difficult, an analysis using NEC-4 generally is a more reliable indicator of antenna performance than can be discerned on an antenna range. In any case, if a vendor's claims for an antenna are not supported by a NEC-4 analysis, the vendor is probably wrong.

Clearly, long-range HF communication requires that we address the two basic issues in all HF circuits: frequency selection and antenna design. Analyzing frequency selection and antenna requirements is greatly facilitated by the automated use of a propagation-analysis program such as ICEPAC. While radiation patterns for many common antennas are readily available in manuals and technical literature, a computer analysis can provide a more precise look at a specific design's performance in a particular situation.

Marconi showed us what was possible. We now have the tools to expediently design and implement the long-range systems that were certainly in Marconi's dreams.

Mr. Farmer, a lieutenant colonel in California's state military reserve, is a professional engineer and president of EFA Technologies, Inc. The former Signal soldier has a bachelor's degree in electrical engineering and a master's in physics, both from California State University. He has published two books and more than 40 articles, and he holds two U.S. patents.

ACRONYM QUICKSCAN

ALE – automatic link establishment
dB – decibel
dBd – decibels-dipole (see sidebar explanation)
dBi – decibels-isotropic (see sidebar explanation)
FOT – frequency of optimum traffic
HF – high frequency
LPDA – log periodic dipole array
Mhz – megahertz
MUF – maximum useable frequency
NVIS – near-vertical-incidence skywave

Antenna measurements – what they mean

Antenna measurements normally involve comparisons expressed in decibels defined as: $dB=10*Log_{10}(P/P_{ref})$. P is the value we're measuring, and P_{ref} is some reference.

Note that dB are logarithmic with respect to the measured value. A convenient rule of thumb is that each three-dB increase requires the power be doubled.

References in antenna work are usually either an *isotropic radiator* or a *dipole*. To keep straight which comparison is intended, an "i" (as in dBi) is used to denote an isotropic radiator and a "d" (as in dBd) is used to denote a dipole.

An isotropic radiator is an antenna that radiates equally in all directions. While it can't actually be built, it's a convenient mathematical "benchmark" against which to compare real antennas.

Since a dipole is a practical antenna, comparisons with it become context-dependent. For example, a half-wavelength dipole in free space has a gain of 2.1 dBi (0.0 dBd=2.1 dBi). Over actual earth, however, the dipole's gain depends on its height and the earth's conductivity and permitivity.

DBi comparisons are usually more meaningful unless the intent is to actually compare the performance of a particular antenna with a dipole installed in a similar manner.

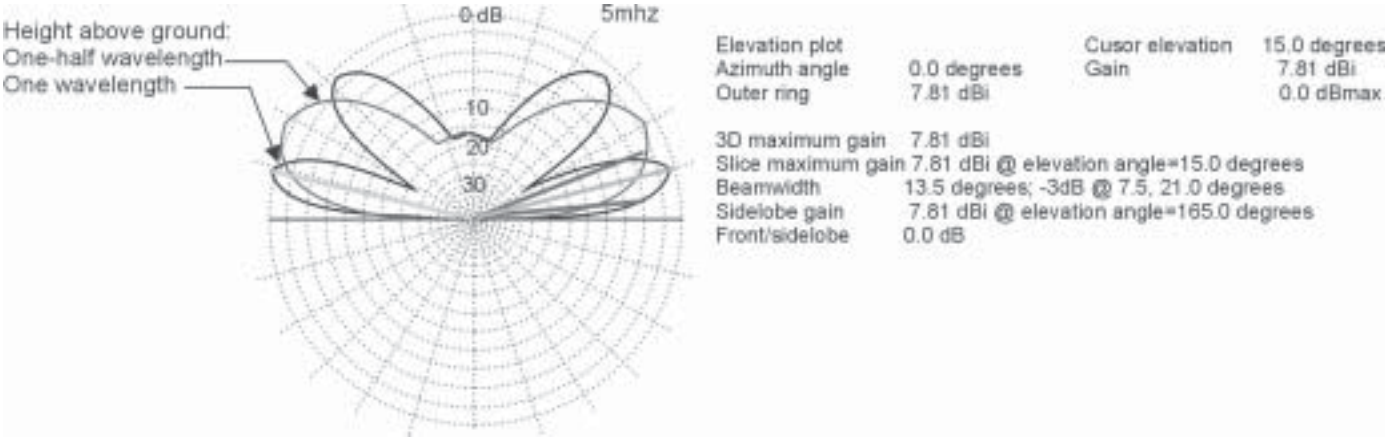


Figure 9. Dipole elevation pattern at one-half and one wavelength over average ground. Note that even though a high-angle lobe appears when the dipole is raised to one-wavelength, the radiation at most of the critical low angles still shows an increase. The "best" gain of this antenna is 7.81 dBi, considerably less than the LPDA.

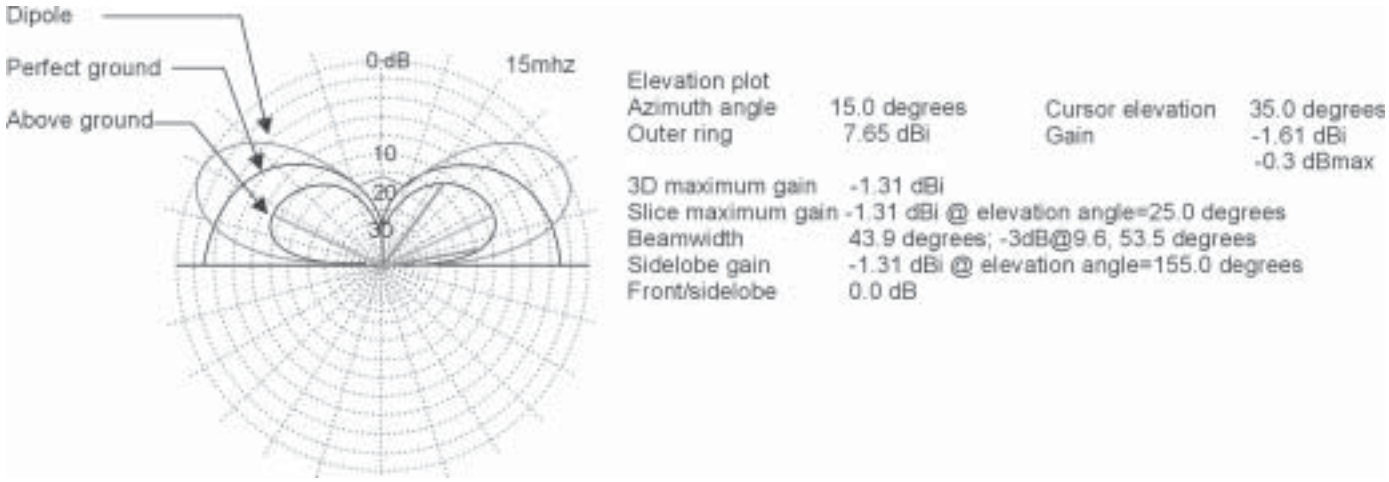


Figure 10. Comparison of vertical over perfect ground, vertical over average ground with radials and dipole at ½-wavelength over average ground. For low-angle radiation, the vertical over perfect ground is hard to beat – unless you're on the ocean! Note that the dipole actually outperforms the vertical-over-average-ground at most angles, even though most of its pattern is at higher angles. This illustrates the often-overlooked fact that while the shape of the pattern matters, it's the amount of gain in the desired direction that's the most important feature.

More information

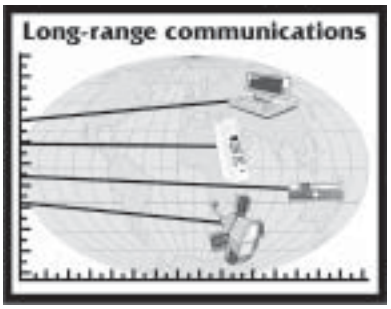
ICEPAC information is available from Dr. Greg Hand's website at elbert.its.bldrdoc.gov/hf.html. The entire propagation-prediction suite can be downloaded without charge, as can extensive documentation. This is the best place for anyone interested in propagation prediction to start.

Another useful tool is the program I developed that works with ICEPAC to evaluate paths in determining useful frequency ranges and antenna take-off angle requirements. My program requires a high-speed Pentium-class personal computer and Windows 2000 or better. A free copy on CD-ROM will be provided to any Defense Department entity that requests it on letterhead. Address your request to: MG Paul Monroe, the adjutant general for the California National Guard, 9800 Goethe Way, P.O. Box 269101, Sacramento, Calif. 95826-9101.

An outstanding reference on antennas – especially the V-beam and other interesting long-range antennas – is ***The ARRL Antenna Book*** (Dean Straw, editor), most notably Chapter 13. ***The ARRL Antenna Book*** is available in bookstores and from The American Radio Relay League, 225 Main Street, Newington, Conn. 06111-1494. Also, try ARRL's website at www.arrl.org. Anyone seriously interested in radio communications should read ***The ARRL Antenna Book*** from cover to cover as many times as it takes.

The NEC code can be obtained from Lawrence Livermore National Laboratory, Attn.: Gerald Burke L-156, P.O. Box 5504, Livermore, Calif. 94550.

EZNEC Pro is a commercial product developed and marketed by Roy Lewallen, W7EL, P.O. Box 6658, Beaverton, Ore. 97007. Under some circumstances, EZNEC Pro can be provided with the NEC-4 computing engine fully integrated, thus saving the trouble of acquiring it in raw form from Lawrence Livermore National Laboratory. You may also obtain the NEC-2 version at lower cost. Try the webpage at www.eznec.com.



Unit-level Logistics System blasting -- is there a better way?

by MAJ Kurt Wadzinski

The 1st Cavalry Division is changing the way units pass logistical traffic.

The current system uses the Army's Single-Channel Ground and Airborne Radio System to conduct a "frequency-modulation blast." A unit has to compile Unit-Level Logistics System information, then connect computer to SINCGARS through the data port and try to send the data. This is a burst transmission that usually takes several attempts to pass the data at a data rate of 2,400 baud.

After the unit sends the FM blast, it must call the distant end to ensure the destination unit receives a complete FM blast. There's no other way to verify if the FM blast was successfully received. Many times a unit only receives part of the blast. Since the FM blast wasn't complete, the sending unit must try again.

National Training Center challenges

Before rotating to the National Training Center at Fort Irwin, Calif., a support unit trains on conducting the FM blast again and again – for example, through a company situation-training exercise, task-force exercise evaluation and other training events leading to NTC. But no matter how much a unit trains, it doesn't quite take into account the conditions at NTC. There distance becomes a big factor; as battalions and their attachments move through the "box," they move out of line-of-sight of the forward-support battalion. This creates an even bigger problem in completing the FM blast, much less contacting FSB to ensure it received the FM-blast traffic.

Once units are out of LOS, they must retrans their net by placing a retransmission team on a hilltop or another piece of terrain to create an LOS connection between the two stations. Then the units try to pass their traffic through the retrans site. Truly challenging! What will the unit do if this fails? The unit tries again and again, until they go back to the "sneaker net." Eventually the unit has to send soldiers in a humvee with a disk of ULLS information; essentially the soldiers drive to FSB with the FM blast in hand. This can be a difficult task when there are several units spread throughout a battlefield trying to blast more than once a day.

Beyond-line-of-sight radio traffic challenges

There are three basic ways of passing radio traffic beyond LOS. The first way is by using a high-frequency radio. Using an HF radio doesn't require special access to a satellite; instead, the radio works in the frequency range of 1.6 to 30 megahertz. HF radio bounces the radio signal off the ionosphere to the distant radio to enable BLOS communication.

The second way is by using a satellite radio such as a single-channel tactical-satellite manpack radio. The radio sends its signal to a satellite that sends the signal to the distant radio. The problem with using satellite radio is that the unit must receive satellite access. Unfortunately, satellite access doesn't get allocated to pass logistical traffic for support units.

The third way to pass BLOS traffic is by using a retransmission site. A retrans site must be placed between two sites that are out of LOS with each other. For retransmission to work, the retrans site must be in LOS with both distant radios trying to communicate. What happens if the retrans goes down or is destroyed? The units using the retrans can no longer communicate.

1st Cavalry solution

The 1st Cavalry Division is passing ULLS-Ground information through the new HF radios (AN / PRC-150). Those radios have a myriad of new capabilities over the old 1970-80 technology of improved HF radio. The 1st Cav is using HF communications' capabilities to solve the logistic-traffic problem.

By placing an AN / PRC-150 using a near-vertical-incidence skywave antenna (sometimes a long whip) and a computer loaded with RF-6710 HF email at two locations – not dependent on terrain or distance (Figure 11) – 2d Brigade Combat Team has validated the system. The RF-6710 HF email is a Microsoft Outlook-based program that looks almost identical to Microsoft Outlook, making it very easy for soldiers to learn and use. This HF email system passes data at 9.6 kilobytes per second using the BLOS HF frequency range and at 16 kbs using the LOS FM frequency range (in case units are close enough to take advantage of the higher data rate).

The HF email also takes advantage of the RF-6710's automatic-repeat request error-correction mode. ARQ ensures every email that shows up as being sent has actually passed successfully at 100 percent; units no longer have to call the distant end after sending every message.

Cav's radio networks

The 2d BCT deployed an AN /

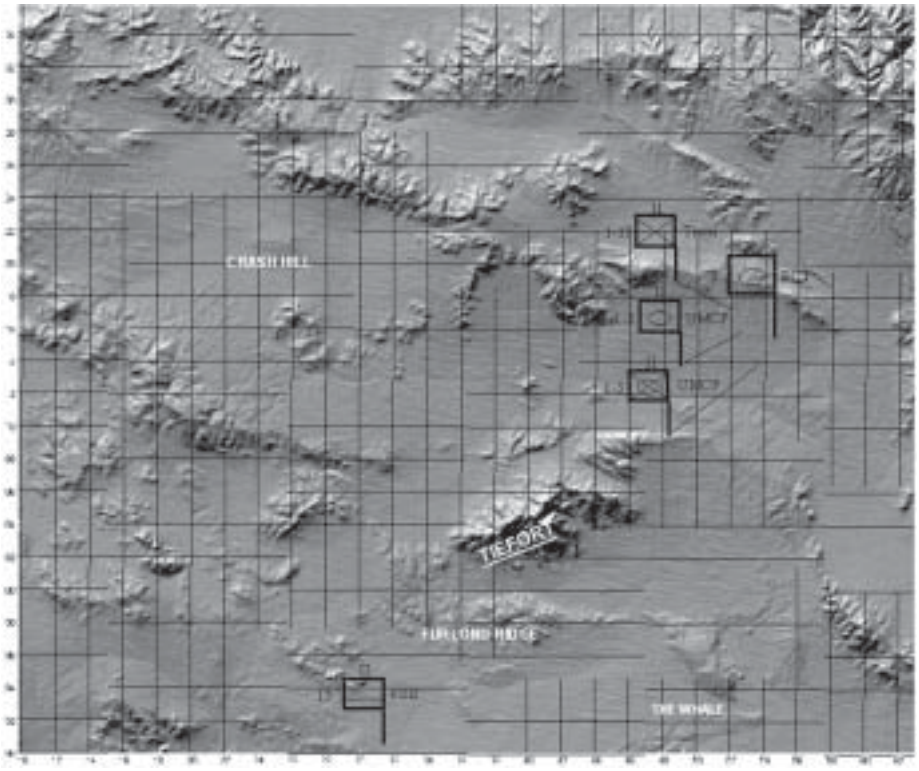


Figure 11. 2d Brigade TOC and battalion UMCPs in NTC's central corridor blasted ULLS data using HF to 15th Forward Support Battalion in the southern corridor (BLOS).

PRC-150 with each unit-maintenance collection point and FSB. The BCT deployed two networks. One network was a logistical one that included six sites: three task-force UMCPs; the headquarters and headquarters company of the brigade, colocated with the Signal and air-defense artillery slice; and the engineers' UMCP – all talking to FSB. The second network was a command-and-control network that included two sites: the tactical-operations center and the commander.

The C2 network ensured communication if the units went BLOS and weren't covered by retrans. The network also used the AN / PRC-150's digital voice 600, which allows the user to communicate through a signal-to-noise ratio of 1:1. (In layman's terms, it allows you to talk through the night when frequencies have a tendency to be more difficult to communicate over.)

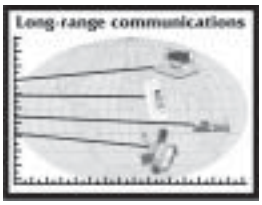
AN / PRC-150 provided 2d BCT with a reliable means to communicate and send its logistical traffic. In the future, these new HF radios will provide 1st Cavalry Division with other mission-enhancing communication capabilities. The 2d Brigade looks forward to integrating the radios into Colt Teams and sees them as a possible solution to communicating with its widely dispersed scout teams. Both units routinely run into BLOS communications difficulty due to distance and terrestrial limitations.

HF communication has come a long way in the last 20 years, and 1st Cav is using the advantages it provides to enhance the division's communication structure.

MAJ Wadzinski is the S-6 for 2d ("Blackjack") Brigade, 1st Cavalry Division. He has also served with 10th Mountain Division (Light) as the 1st Brigade S-6; was the Office of Military Cooperation's J-6 automation and communications adviser for the Kuwaiti defense forces; and spent a year with the private company TRW working with the Force XXI Battle Command Brigade and Below System.

ACRONYM QUICKSCAN

ARQ – automatic-repeat request
BCT – brigade combat team
BLOS – beyond line of sight
C2 – command and control
FM – frequency modulation
FSB – forward-support battalion
HF – high frequency
Kbs – kilobytes per second
LOS – line of sight
NTC – National Training Center
SINCGARS – Single-Channel Ground and Airborne Radio System
ULLS – Unit-Level Logistics System
UMCP – unit-maintenance collection point



A 10-mile-high communications tower?

by MAJ Shawn Hollingsworth

As far-fetched as the concept of an ultra-high communications tower may seem, we're living in a time when what was the impossible is now the probable.

Twenty years ago the Defense Department funded research on an unmanned aircraft that has solar power, the potential for extreme endurance (three to six months of continuous flight) and can fly 50,000 to 65,000 feet (9.46 to 12.3 miles) above the earth's surface. The Pathfinder, surrogate to Helios I, was the project name then and still is today.

Along with the unmanned aircraft, a number of bright minds at DoD in the early 1980s came up with the idea of using an ultra-high-altitude communications platform that also serves as an intelligence, surveillance and reconnaissance gatherer. Overcome by expense, the program has continued to develop, but at the pace of the technology used on the vehicle.

The solar array is the vehicle's primary power source and greatest cost, to the tune of $10 million per aircraft. The latest in solar technology is slow in development and cost-prohibitive except where the benefits outweigh the costs. The good news is that the extra kilowatt of power the solar panels produce is more than enough to power up to 220 pounds of command, control, communications, computers and ISR-enabling equipment, not to mention the cost savings and availability when compared to satellite usage. The next step in developing the platform is Helios II, which will reach altitudes of 100,000 feet and carry a 700-pound payload.

Currently Helios I makes day flights characteristically flown to a predetermined altitude of 50,000 to 80,000 feet, then gracefully descends to the earth's surface. Helios set a world record Aug. 13, 2001, by ascending to 96,863 feet before beginning its descent. In case anyone thinks the commercial industry doesn't see the benefit of an ultra-high communications tower, look at www.skytowerglobal.com; there are plans to launch fixed and mobile broadband, voice and direct-broadcast audio and video using this platform in 2003.

Why should the Army as well as the other services be interested in developing communications and ISR packages for this platform? Other than Helios being a shining example of beyond-line-of-sight communications, the answers are cost, availability, survivability, mobility, deployability, duration and one huge area of coverage ranging in excess of a 400-mile-diameter LOS footprint. Helios affords the capability of communicating with space-based and terrestrial-based communications assets, whether fixed or mobile, ship-to-ship or unit-to-unit, across the battlefield.

Given the possibilities of such a supertower, Helios has the interest of commercial industry. This summer Helios I is scheduled to launch with a commercial communications package. Later this year, the Japanese plan to test remote-sensor equipment on the bird. Funding for 2002 is essentially committed as far as the federal government is concerned, but we should develop avenues of approach for 2003.

The Fort Gordon, Ga., Battle Command Battle Lab – along with the National Aeronautics and Space Administration and Space and Naval Warfare Systems Command – are aggressively examining candidate technologies for use on the platform. There are a number of communications packages to consider for integration on Helios. The Enhanced Position-Location Reporting Systems, near-term digital radio and Single-Channel Ground and Airborne Radio System are front-runners for integration, with Small-Unit Operations / Situation-Awareness System waiting in the wings as technology develops. There are a host of ISR tools viable for consideration on this platform, but subject-matter experts need to contact us about the ones best suited for this use.

The most daunting task for consideration is the frequency spectrum. In the United States, for instance, there's a 1,000-foot limitation placed on SINCGARS as well as a 54-kilohertz ceiling on the operational spectrum. Similar issues affect each option under consideration. Managing the frequency spectrum is nothing new, which is why a spectrum-request package that addresses both foreign and domestic frequency use is under development.

Developing Helios for use in military operations is a smart move; the sky is literally the limit. A number of Army, Navy, Air Force and Marine future operational capabilities will come to realization sooner by employing this platform.

If you're interested in being involved in this effort and can provide assistance with its development, contact me at (706) 791-4819 (DSN 780-4819), or email hollings@gordon.army.mil or shawn-hollingsworth@us.army.mil.

MAJ Hollingsworth is chief of the Integration and Evaluation Division at Fort Gordon's Battle Command Battle Lab.

ACRONYM QUICKSCAN

DoD – Department of Defense
ISR – intelligence, surveillance and reconnaissance
LOS – line of sight
SINCGARS – Single-Channel Ground and Airborne Radio System

Symposium focuses on high-tech training

Opening ceremony looks toward future

by PFC Zoe Morris

As the 29th Signal Regimental Symposium kicked off Nov. 28, senior officers explained just how the Signal Regiment fits into the big picture, and where to go from here.

One element of the Signal Regiment's involvement in the Army's transformation is the University of Information Technology, the brainchild of the Signal Center at Fort Gordon, Ga. UIT is intended to streamline the initial-entry training process and keep Signaleers educated as they move through their Army careers.

"To achieve that vision (of Army transformation), we're going to have to transform the way we train our soldiers," said MG Pat Cavanaugh, commander of the Signal Center and Fort Gordon.

He explained how students in advanced individual training are taught things initially they may not retain until Week 10, much less to their first duty station.

They may also be sent to a station that uses different equipment than they were trained on, Cavanaugh said.

He pointed out how, between AIT and the basic noncommissioned officer course, there's a possible four-year gap where soldiers get little training.

"What we have here," Cavanaugh said, "is we don't have any formalized way of training those soldiers on those skills that are out there."

There are officers out in the field, Cavanaugh said, who use their own time and resources to fill that gap. With UIT, lifelong learning would be easy and mandatory to fill the Army with better-trained soldiers faster, he said.

A huge part of the distance- and lifelong-learning concepts is simulations. The simulations, Cavanaugh said, look like, move like and sound like the real thing. The simulations are computer programs that have every detail of equipment on which soldiers need to be trained.

Figure 12. Chief of Signal MG John Cavanaugh briefs Signaleers on the state of the Regiment at the annual symposium.

"Simulations allow for the unit in the field and the soldier in the field to get that information at the teachable moment," he said.

But new technology will not only help train soldiers, it can help them out in the field in warfighting capabilities.

"What we desire to do," said LTG John Riggs, director of the objective-force task force, "is use the power of information technology to be able to see first with situation awareness, to understand first with situation understanding and to give ourselves the ability to act first with qualitative rapid decisions to finish decisively."

"There are several backbones (to transformation) in this particular phase," said Riggs, "but information dominance is clearly one of them."

Information dominance means fast, clear communication. Army Knowledge On-line is a new website set up to become a single portal for everyone to use, said LTG Peter Cuviello, director of information systems for command, control, communications and computers, office of the secretary of the Army. Cuviello said the Army will be web-based in the future. (See related story, Page 52.)

The Signal Regiment, all three generals stressed, is a big and important part of Army transformation.

The Regiment is also implementing huge changes within itself.

"We need your advocacy, support, commitment to implement this plan," said Cuviello, "to ensure the Army has the information

dominance and decision dominance to win decisively, both as a warfighter and in our business practices."

PFC Morris is a staff writer with ***The Signal****, Fort Gordon's post newspaper.*

Figure 13. LTG John Riggs, director of the objective-force task force, speaks on information technology's role in the Army's transformation.

ACRONYM QUICKSCAN

AIT – advanced individual training
UIT – University of Information Technology

Cuviello addresses 'knowledge-based force'

by Denise Allen

With a mandate for transforming the Army, leaders asked for help in making changes at the 29th annual Signal Regimental Symposium.

LTG Peter Cuviello, the Signal Center's former commander and now director of information systems for command, control, communications and computers with the office of the secretary of the Army, said transformation is a positive time.

"The glass is definitely half full," he said in a speech at Fort Gordon, Ga., Nov. 28. "We have the leaders of the Army, the chief and secretary, on board. Their hand is in a lot of what is going on. They are pushing."

While some say change is happening rapidly, Cuviello said the opposite.

"I will tell you we're not moving fast enough," he said.

He discovered how slow change can be not long after assuming his post in August 2000. When the Army's chief of staff decided he didn't want to send out unencrypted email any longer, Cuviello said it should only take about a week to get encrypted email.

Four months later, all the chief's email was encrypted.

"The local server was generated by 45 different servers," he said of one of the problems faced in performing the task.

A goal of transformation is to turn the Army into a "network-centric knowledge-based force," he said. An integral key to this aspect of transformation is Army Knowledge Management.

AKM is "intended to improve" the decision-making processes of everyone from warfighters to those on the business side of the Army, he said.

A part of AKM is Army Knowledge On-line, a single portal for every soldier, Reservist and Army civilian to securely access the Army's new "infostructure."

"Eventually, 1 million people will be on it," Cuviello said.

On Oct. 1, all soldiers, Reservists and Army civilians were required to have their AKO accounts set up.

Figure 14. LTG Peter Cuviello discusses the changes the Army's new "infostructure," Army Knowledge On-line, will bring about.

"The Army will be web-based," he said. "It will take some time to get there."

Cuviello touted the attributes of AKO, which has instant messaging capabilities, is customizable and will provide a single email account that will stay with the user throughout his or her career.

The Army has a public website in addition to its two versions of AKO. AKO is an unclassified site;

however, there is a classified website, AKO-Secret, which has about 3,500 users. Its features include secure instant messaging, secure webmail and secure knowledge centers.

Change can be overwhelming, but Cuviello encouraged those in attendance to see a larger scope and know that change is "within" them, not just around them. "It's important to synchronize our vision. We have to have people who understand where they fit," he said. "It's a journey."

Ms. Allen is a staff writer for ***The Signal****, Fort Gordon's post newspaper.*

ACRONYM QUICKSCAN

AKM – Army Knowledge Management
AKO – Army Knowledge On-line

Biometrics may be wave of future

by Denise Allen

Kristin Schaad inserted a smart card into her computer, but before she could access the computer she had to place her finger on a pad at the bottom of her keyboard.

Recognizing that Schaad was who she claimed to be, the computer granted her access.

Schaad, a contractor with the Department of Defense's Biometrics Management Office in Arlington, Va., demonstrated the new technology at the Signal symposium.

"This is where we're headed," said LTC Robert Bollig, deputy director of the DoD BMO, at a briefing on biometrics at the Signal Center Nov. 29.

Biometrics are "measurable physical characteristics and personal behavioral traits that can be used to recognize the individual or verify the identity of an individual," he said.

Among them are facial recognition, fingerprints, hand and finger geometry, iris scan, signature verification and speech recognition.

The DoD BMO opened in July 2000. One of its projects is to examine commercially made, off-the-shelf biometrics products and evaluate them for military use.

"We want to do whatever we can to provide positive proof of identification," Bollig said.

Biometrics provides a higher degree of security than a password, which can be forgotten, or a key or card, which can be lost or stolen.

With the fingerprinting device, the computer took the print and graphed it with a series of dots that were transformed into a mathematical algorithm.

"It's a template of certain points and the relationship between them," Bollig said. "There's no way to reconstruct them."

The biometrics-technology industry is relatively young, and some challenges have arrived when researching the products available.

The commercial products have only been tested on small groups of people. Sometimes, the products come with documentation written in one language and operating systems in another.

When testing one product, BMO officials had to find a Japanese interpreter because all the documentation and the keyboard were in Japanese.

While it's not a function of BMO to research and develop biometrics technology suited to military uses, officials there are finding that establishment of a research-and-development unit may be necessary. "Commercial products aren't doing it," Bollig said. "We need rugged devices for harsh environments."

Ultimately, biometrics technology will find its way to the battlefield, where a soldier's voice or fingerprint will become his password.

"By 2012, biometrics will be the universally empowering technology that ensures the right person with the right privileges has access at the right time to support warfighting," Bollig said.

Figure 15. LTC Robert Bollig, deputy director of DoD's BMO, demonstrates the concepts of biometrics for Signal symposium attendees.

Ms. Allen is a staff writer for ***The Signal****, Fort Gordon's post newspaper.*

ACRONYM QUICKSCAN

BMO – Biometrics Management Office
DoD – Department of Defense

3 Signal leaders inducted as Distinguished Members of the Regiment

by Lisa Alley

Two retired officers and one of Signal's foremost experts were inducted as the newest Distinguished Members of the Signal Regiment during the Signal symposium in November 2001 at the Signal Center.

Retired LTG Douglas Buchholz was a familiar face at the induction ceremony, since he served as Chief of Signal in the mid-1990s. Buchholz was inducted for consistently leading the Signal Regiment with vision, decisiveness and a true passion for the Regiment.

His career began in 1968 when he completed the Signal basic course and began serving in a variety of leadership positions. In 1971 he was assigned to the U.S. Army in Vietnam, where he commanded 510th Signal Company and 9th Signal Battalion soon after company command. In 1988 he took command of 3d Signal Brigade, where he was the first to field corps-level mobile-subscriber equipment.

Figure 16. Retired LTG Douglas Buchholz.

In 1994 Buchholz assumed command of the Signal Center and Fort Gordon, Ga., simultaneously serving as Chief of Signal. This tenure was especially noteworthy, as it came during a time of uncertainty about the mission and role of the Signal Regiment and Fort Gordon. However, his dedication and leadership brought direction and stability during changing times. He reenergized and greatly expanded the role of the Regiment and Fort Gordon.

Buchholz's last position on active duty was as director of the Command, Control, Communications and Computer Systems Directorate (J-6), where he served as a trusted adviser to the chairman of the Joint Chiefs of Staff.

Another DM inductee was Dr. Michael Gentry, Army Signal Command's technical director and chief engineer, who was inducted for his accomplishments throughout a 30-year career. One of those accomplishments was developing and executing the strategy leading to the transition of U.S. Army Information Systems Command to ASC. Also, because of Gentry's technical strategies, writings and leadership, the Department of the Army pursued open-systems, multivendor, commercial-off-the-shelf solutions for Army-wide interoperability and asset sharing. Gentry's technical expertise resulted in quantum changes in implementing viable information dominance according to Joint Vision 2010 and Army Vision 2010.

Gentry has earned a sterling reputation as an expert in Department of Defense information-technology matters and is widely sought after as a consultant. He recently shared his expertise in an article on next-generation networks in ***Army Communicator***'s Spring 2001 edition, as well as the Global Information Grid in this edition. As Chief of Signal MG John Cavanaugh said while inducting Gentry as a DM, he is "always pulling the Regiment forward."

Figure 17. Dr. Michael Gentry.

Figure 18. Retired COL Robert Snead.

Retired COL Robert Snead, program manager for General Dynamics Corp.'s MSE resident school at Fort Gordon, completed a distinguished career as a Signal officer after serving more than 32 years. His major assignments were chief of the Presidential Support Office, Defense Communications Agency; command at all levels from platoon to brigade; president of the communications-electronics test board at Fort Gordon; and chief of staff for 7th Signal Command at Fort Ritchie, Md. During his active military service, he consistently set an example of high standards for all to emulate.

Soon after he retired, he became operations manager and then program manager for the MSE resident school. He is involved in local-community activities that focus on serving Signal soldiers and their families. For instance, he has served four consecutive terms as president of the Greater Augusta-Fort Gordon Chapter of the Association of the United States Army. He served two years as Georgia's AUSA president and was selected as the Third Region's AUSA executive vice

president. He has also served for the past 12 years as a member of the Metro Augusta Chamber of Commerce military-affairs committee and was selected by Georgia's governor to serve on his military advisory council. Snead is also a charter member of the Signal Corps Regimental Association and a key supporter of its activities.

"I accept [induction as Distinguished Member] with humility, knowing there are more deserving people sitting in the audience," Snead remarked as he was inducted.

The Distinguished Member of the Regiment program was instituted when the Regiment was activated in 1986. The program recognizes people who make special contributions and distinguish themselves in service to the Regiment. DM positions are designed not only to recognize people whose service is most notable, but also to promote and enhance the Regiment's history and traditions and to foster cohesion among its members.

*Ms. Alley has edited **Army Communicator** since June 1995. Previous positions include editor of **The Sheppard Senator**, the installation newspaper at Sheppard AFB, Texas; and various jobs in the public-affairs office at Fort Ord, Calif., including editor of the award-winning post newspaper **Panorama**, command information officer and 7th Infantry Division (Light) and Fort Ord division move and base closure information specialist. A former soldier, she has also served as a military and civilian reporter, accumulating about 25 years' total experience in journalism and Army public affairs. She has served as a Keith L. Ware (the Army journalism awards) judge and traveled to London, England, upon invitation to speak to defense and aerospace industry representatives about how the Signal Regiment uses the worldwide web. Formerly the U.S. Army Signal Center and Fort Gordon web manager, she was also a seminar leader on public affairs and the web in the 2001 Worldwide Public Affairs Symposium.*

ACRONYM QUICKSCAN

ASC – Army Signal Command
AUSA – Association of the United States Army
DM – distinguished member
MSE – mobile-subscriber equipment

Association offers Regimental items on website

by Lisa Alley

For Signaleers wondering where to get coffee mugs, golf shirts, hats or other items that have the Signal Regiment crest on them, the Signal Corps Regimental Association offers such items on its website.

The new secure on-line store, unveiled at Signal symposium time, also offers the limited-edition Signal heritage print, "140 Years of Signal Heritage," recently redone in color by the original artist, Josef Nackowicz. Nackowicz painted the original black-and-white, "130 Years of Signal Heritage," print while on active duty; SCRA recently commissioned him to update the painting.

Prints are numbered from the 500-print limited edition and signed by the artist. Specific numbers can be requested and will be met on a first-come, first-served basis, according to SCRA national manager Amy Tuschen.

SCRA plans to expand its on-line store, said Tuschen. "We bought out the merchandise from the [closed] bookstore and we'll be growing from there," she said.

In addition to the Regimental items and the Nackowicz print, another on-line feature is the opportunity to join SCRA and, for its members, renew and pay for awards already approved. Transactions are secure, Tuschen said.

"I think of our on-line features as the Big Four: the Regimental Bookstore stuff, paying for awards, renewing membership and buying a print," Tuschen said.

Added merchandise items SCRA is considering include Regimental flags, books on Signal topics, golf tees and golf balls. "I'm open to suggestions," Tuschen said.

Also, although the golf shirts are embroidered with the words "Signal Corps Regimental Association," Tuschen said they could be customized to say just "Signal Regiment" or other verbiage – contact the SCRA national manager for more information.

Chapter business will be conducted on-line more in the future, the national manager said. Eventually chapters will be able to submit their reports to the national office on-line, Tuschen said. The national office plans to offer a chapter officer's handbook on-line as well.

SCRA's website is www.signalcorps.org – the on-line store is linked right off the homepage. Contact the national manager at tuschena@gordon.army.mil or (706) 791-3919.

*Ms. Alley has edited **Army Communicator** since June 1995. A former soldier, she has served as a military and civilian reporter, accumulating about 25 years' total experience in journalism and Army public affairs.*

ACRONYM QUICKSCAN

SCRA – Signal Corps Regimental Association

29th SIGNAL REGIMENTAL V2020 SYMPOSIUM
Transforming The Regiment In The New Millennium

Scenes from the symposium

Figure 20. A vendor demonstrates a computer laptop program to LTG Peter Cuviello, director of information systems for command, control, communications and computers.

Figure 21. Showing unit pride and welcoming former unit members, a 22d Signal Brigade representative mans his unit's display at the unit reunions hosted by the Signal Corps Regimental Association.

Figure 19. From left, COL Bernard Kulifay, head of the Signal Center's Leader College of Information Technology, MG John Cavanaugh, Chief of Signal, and CW5 Pete Hewitt, the Regimental chief warrant officer, cut the ribbon to "unveil" the new Senior Technical Leaders of the Signal Regiment/Council of Fives Gallery Nov. 26 at Signal Towers. The gallery recognizes contributions to the Regiment that senior Functional Area 24 (information-systems engineer), FA 53 (information-systems manager) and chief warrant officers five holding military-occupational specialty 255Z make. Together with the Commander's Gallery just outside the Signal Cafe's door, all senior Regimental leaders are recognized. "It's an honor for me to unveil this long-overdue recognition," the Chief of Signal said after he cut the ribbon. "This gallery will show everyone who passes by the vitality and diversity of the Signal Regiment. The leaders represented are critical to the Regiment's future and will help lead the Army to information dominance in the objective force. Officers and warrant officers should strive to hold the leadership positions occupied by these leaders. Getting your picture on the 'wall' should be and will be a distinction all leaders will cherish."

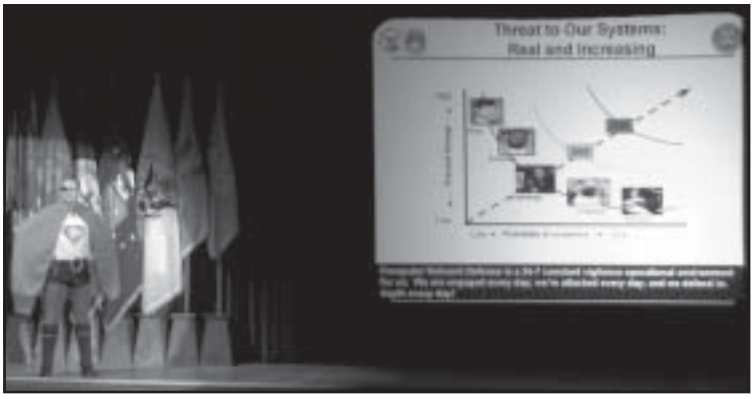


Figure 22. MG Dave Bryan as "Cyberman" brings a sense of humor to a serious subject (computer-network defense).

Tower climbing in 41st Signal Battalion

by CW2 Robert Fields

There would be no armed-forces television, radio or other communications for U.S. soldiers in Korea without sky-climbing Signal soldiers.

The 41st Signal Battalion maintenance-support team's mission is to provide organizational through general-support maintenance to 41st Signal Battalion's strategic sites on a 24-hour basis. Equipment supported includes Armed Forces Network television, frequency-modulation and amplitude-modulation broadcast transmitters, digital and analog microwave-radio systems, asynchronous-transfer-mode switches, battery float systems and all tower and antenna systems associated with major systems, including microwave, air-traffic-control radios and other communications systems.

Within MST there's an antenna section that performs a variety of tower and antenna-system maintenance support in the Republic of Korea. The antenna section maintains all towers and antennas 41st Signal Battalion owns or maintains. In addition to performing preventive-maintenance inspections, the section also relocates antennas as well as makes small installations and de-installations. The antenna section is responsible for maintaining 30 towers at 27 locations from the Demilitarized Zone to Pyongtaek. (The 36th Signal Battalion is responsible for the area from Pyongtaek to Pusan.)

The antenna section consists of two tower-certified Korean-national employees and four soldiers holding military-occupation specialty 31L with additional-skill identifier F2 (soon to be redesignated J2).

To become a certified tower climber and receive the J2 ASI, a soldier must attend the J2 course at Sheppard AFB, Texas (course number J3ABR2E632-007). An in-house qualified instructor, approved commercial vendors or outside organizations can conduct tower-climbing certification training; however, none of these may award the J2 ASI without the Signal Center's approval.

Soldiers must demonstrate their ability to climb at least 100 feet and carefully hoist to a working level; perfect the function of body harnesses, lanyards, lifelines and fall-arrest systems; use hand lines for lifting required tools and equipment; maintain and clean their equipment; and check for damage and excessive wear. To accomplish their tasks using extreme safety precautions, they must identify hazards and perform their job by using the provided protection.

In Korea, environmental factors such as severe cold weather, monsoons, high winds and extremely humid days play a major factor in the maintenance support for tower and antenna systems. Unique hazards not normally encountered elsewhere are present during installation or maintenance of communication equipment on towers and poles. The main hazards associated with climbing poles and towers are falls and contact with electric power lines and systems.

People who perform operations of a potentially hazardous nature or functions that may create a hazardous situation on towers and poles will be certified as to their capabilities to perform those operations and functions safely. Added to the environmental challenges, we face the problem of maintaining tower-certified personnel. The battalion receives many 31Ls PCSing into Korea; however, very few of them have the ASI necessary to perform the tower-climbing duties MST needs.

Our unit policy is that when soldiers are climbing towers and installing or performing maintenance on antenna systems, work doesn't begin until a safety observer is present. The observer should have a current tower-climbing certification and won't be assigned to any other duties. Observers will be proficient at the task being observed, along with its particular hazards, as the observer briefs potential hazards / dangers to persons entering the work area. The observer must also be proficient in performing

How to become a sky-climber

Soldiers who wish to attend the Sheppard course and obtain the J2 ASI must meet the following prerequisites:

- Possess MOS 31L;
- Demonstrate the ability to climb and work at heights above 100 feet without fear;
- Be assigned and enroute to a job requiring the ASI; and
- Be selected either by Personnel Command or the local commander to attend training.

"Most of the positions requiring ASI J2 are in Korea at 1st Signal Brigade units, at Fort Huachuca, Ariz., and at Fort Detrick, Md.," said Jerry Baker, chief of the Enlisted Division, Office Chief of Signal (the Signal personnel proponent), Fort Gordon, Ga. "If you are a 31L E5 or below being assigned to one of these places, you should seek information from your assignment representative at Department of the Army as to whether you should attend the ASI school."

Figure 23. Korean nationals inspect the wave guide on the top microwave antenna while two staff sergeants inspect the repeater antenna and the bottom microwave antenna. This is all part of the quarterly preventive-maintenance inspection of the Namsan microwave tower.

cardiopulmonary resuscitation and emergency first-aid treatment that involves controlling bleeding, shock, open wounds and burns.

The antenna section performs scheduled PMIs quarterly and annually, and they're scheduled and maintained using DD Form 314. During a PMI, the tower and antenna system are inspected and all deficiencies are documented. Inspection items include checking for missing or damaged hardware, broken parts of welds, loose bolts and conditions of tower supports for indications of rust, corrosion and cracks. Also, the grounding system, lighting and color banding are checked for function ability and if they're in compliance with applicable regulations. On AM or guyed towers, the guywires are checked annually for correct tension at each level. Added to scheduled maintenance, the antenna section also performs unscheduled repairs on the tower or antenna system.

The section is often called upon by other units to provide conduct special projects. Recently, to support a digital-microwave upgrade project, the antenna section was asked to relocate a vital antenna system from the tower at Papyongsan to a nearby roof. This antenna system is used for tracking aircraft patrolling the DMZ, and it's vital to the ROK's security. As a result of the hard work and dedication of the antenna section's soldiers and Korean nationals, the project was carefully planned and completed in half the time projected.

Over the last five years, the antenna section has averaged more than 150 climbs a year but hasn't had any safety-related accidents.

Tower climbing in 41st Signal Battalion is both challenging and rewarding. The soldiers and Korean-national employees work hand and hand to ensure our towers and antenna systems are maintained at a high state of readiness.

CW2 Fields is MST's officer in charge and is assigned to Headquarters and Headquarters Detachment, 41st Signal Battalion, Yongsan, Korea.

ACRONYM QUICKSCAN

AM – amplitude modulation
ASI – additional-skill identifier
DMZ – Demilitarized Zone
MOS – military-occupation specialty
MST – maintenance-support team
PMI – preventive-maintenance inspection
ROK – Republic of Korea

Information-technology program puts shipbuilder on FasTrak

by Stephen Larsen

FORT MONMOUTH, N.J. – Among the key workers building U.S. Navy vessels in the shipyard at Bath Iron Works, Maine, are the welders, the electricians and the person standing behind them wearing a vest.

That person is a designer / liaison from the engineering department. The vest is a "computer suit" hooked into mobile information-systems technology, including a computer tablet, wireless phone and digital camera – and where there's enough bandwidth, a videocamera for streaming video. It's all part of a Joint Computer-Aided Acquisition and Logistic Support application called FasTrak, developed through a technology partnership with Bath Iron Works, the U.S. Supervisor of Shipbuilding Bath and Computer Sciences Corporation.

FasTrak extends the services of remotely located designers and engineers, as well as making available the vast array of logistics data – drawings, specifications, plans – from wherever they reside in the database, right to the worker building the ship. The result? Bath Iron Works, which has been using FasTrak since November 2000, can now resolve ship-construction problems in minutes rather than days.

A case in point: say a pipefitter is installing a pipe in a ship, only to find the space needed for the pipe is taken up by a cabinet or some electrical conduit. The computer-vested FasTrak designer / liaison can snap a digital photo and post it on-line. Engineers at a remote location can compare the "as is" picture with computer-aided-design models and drawings. The engineers can diagnose and correct the discrepancy and post corrective drawings, parts lists and instructions on-line in the JCALS work folder – which the person wearing the computer suit / vest can display on his computer tablet for the person with the tool in his hand – an efficient and secure electronic transfer of technical data and a timely resolution of the production problem.

FasTrak saves money

This implementation of FasTrak has slashed the time (which translates to money) needed to make on-site internal correction at Bath Iron Works. Larry Tondreau, Bath Iron Works' project manager for FasTrak, said they're still crunching the numbers to quantify exactly how much time and money. "But I do know that FasTrak has allowed us a 74-percent reduction in our paper products," said Tondreau. "We at the engineering division used to need four different paper products, and a long timeline, to get an internal correction made. Now we

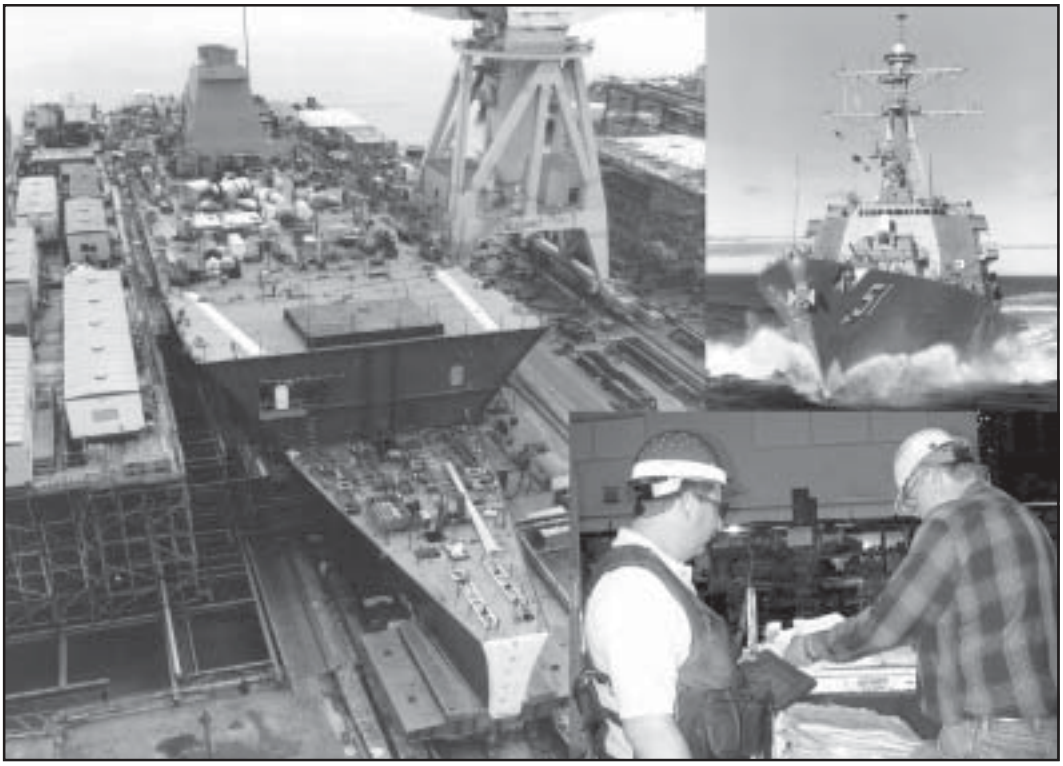


Figure 24. Bath Iron Works, Maine (left) – shipyard for technologically advanced surface-combat ships such as the *Aegis* guided-missile destroyer (upper right) – can now resolve ship-construction problems in minutes rather than days, thanks to a JCALS application called FasTrak. A liaison (lower right) wearing a "computer suit" vest is hooked into mobile information-systems technology, including a computer tablet, wireless phone and digital camera. FasTrak extends the services of remotely located designers and engineers right to workers building the ship.

only need one paper product."

That's important when you consider the workload of Bath Iron Works, which is International Organization for Standardization 9001-certified by the American Bureau of Shipping. Bath Iron Works has been the lead shipyard for 10 surface-ship classes (more than any other U.S. shipyard) for the U.S. Navy. These include the Arleigh Burke Class ***Aegis*** guided-missile destroyer, the most technologically advanced surface-combat ship in the world – which, like a huge steel puzzle, take years to build, component by component, module by module.

"Now, thanks to FasTrak," said Tondreau, "any changes we make on one ship, we can roll down to other ships that have the same impact and we'll go out and fix those."

How FasTrak keeps track

Changes that designers make to drawings or parts lists via FasTrak ripple down, via "parent/child" relationships, throughout all the logistical data in the JCALS Global Data-Management System database, according to Nannette Stueck, a CSC employee who is the project manager for JCALS database liaison at Bath Iron Works.

Stueck said that FasTrak then creates the job flows and taskings based on templates stored in the JCALS workflow-manager software, which models the engineering process and assign roles or individuals to the tasks.

"GDMS enables Bath Iron Works to task the job through all the processes needed to do that job," said Stueck, "and it lets them know this team's got to do that job."

These templates are continuously refined to reflect improvements to the engineering process.

"The templates allow the engineering division to 'see' the workflow process," said Stueck. "They can see which steps are and aren't value-added. Then, they can modify and improve the process, eliminating unnecessary or redundant tasks."

And that, according to COL Robert Buckstad, the PM for JCALS, points to the true value-addition of JCALS, a joint-service program with the goals of designing more supportable weapon systems; transitioning from paper-based to digital logistic and technical information; and acquiring and distributing logistic and technical information in digital form.

"A lot of people, when they think of JCALS, think only of electronic technical manuals," said Buckstad. "Joint technical manuals are a JCALS product. But to get to that product, we have to collect an enormous amount of data – and that all goes into the JCALS database, where all members of the enterprise can access it. And that's the true value of JCALS – in helping Defense Department activities re-engineer their business processes."

Tom Sepka, deputy PM for JCALS, echoes that idea.

"The idea is, buy the data once and use it many times," said Sepka. "There are many applications out there that provide solutions, but JCALS is the only DoD-owned solution – and JCALS is accredited, secure and sustained. We can do it in an enterprise environment. Any member across your enterprise who is tied into the database – and who you allow to – can take advantage of the data and use it to re-engineer their business processes in a more efficient way."

JCALS infrastructure

Sepka said there are about 60 operational JCALS sites within DoD supporting business processes ranging from acquisition, engineering, data management, maintenance to supply. JCALS is furnishing more than 35,000 users in all services with an interoperable infrastructure that provides seamless, authorized access to information regardless of where it's stored, how it's accessed or how it's formatted. When fully deployed, Sepka said, JCALS will support 245 global locations supporting more than 200,000 users – such as the 1,000 FasTrak users at Bath Iron Works.

As Larry Tondreau put it, "Building a U.S. Navy ship takes years and involves the inner fabric of the whole shipyard. It gets very complicated real quick. So having FasTrak to expedite the process of making changes is a great help."

"And FasTrak can similarly benefit other DoD developers of complicated, sophisticated systems, such as aircraft or tanks," said Sepka. The proof? Just look at the success of the FasTrak implementation at Bath Iron Works.

Mr. Larsen is the public-affairs officer for the program executive office, enterprise information systems, at Fort Monmouth.

ACRONYM QUICKSCAN

CSC – Computer Sciences Corporation
DoD – Department of Defense
GDMS – Global Data-Management System
JCALS – Joint Computer-Aided Acquisition and Logistic Support
PM – project manager

Wings of the Signal Corps:
the story of MAJ Harold Melville Clark

by CPT Kevin Romano

Sept. 18, 1947, may not seem like an important day for the Signal Corps or the U.S. Army. However, this date marked the first day the U.S. Air Force began to operate as an independent armed service from the Army. Previously the aviators were part of an aviation section within the Signal Corps.

Forming a separate air force led to events establishing Clark Air Base in the Philippines, thus creating one of only two U.S. military installations named in honor of Signal Corps officers. (The other installation is Fort Greely, Alaska, named after BG Adolphus Greely.) Clark Air Base was named to pay tribute to MAJ Harold Melville Clark, an early Signal Corps aviator.

Birth of aviation; pioneering aviators

The events tying a U.S. Air Force base to a Signal Corps officer began much earlier than the Air Force's birth, since America's military aviation began in the Signal Corps. In 1892, Greely – who was at that time chief signal officer – created a balloon section within the Signal Corps. As pointed out in ***The Story of the U.S. Army Signal Corps***, this was the "first all-military aeronautical organization in the U.S. Army." Greely realized the tremendous advantage that balloons could provide in military operations. He saw balloons as being used for signaling and observation as well as fire control for the field artillery.

From this inauspicious beginning, military aviation in the Signal Corps grew continually. In July 1914, Congress created an aviation section within the Signal Corps. With this act of Congress, the Signal Corps was responsible for all Army aviation. This responsibility included balloons, airships, airplanes, training, procurement, maintenance, mission support and research and development. This sole responsibility would stay with the Signal Corps until May 1918, when the aviation section formed its own branch within the Army.

With creation of an aviation section within the Signal Corps in 1914, many famous military aviators share a common heritage with the Signal Corps. Some famous Signal Corps aviators include GEN Henry "Hap" Arnold, commander of the U.S. Army Air Forces during World War II, and GEN Claire Chennault, commander of the famed "Flying Tigers" during World War II. But more importantly, Army aviation and the U.S. Air Force owe their heritage to the bravery and foresight of the early Signal Corps aviators. One of these pioneering aviators was Clark.

Figure 25. Harold Melville Clark shortly after being commissioned a second lieutenant in the cavalry.

Clark's early military career

Harold Melville Clark was born Oct. 4, 1890, to Charles Asa Clark and Amanda Palmer Clark in St. Paul, Minn. The Clark family had a strong military tradition dating back to the Revolutionary War. Clark's older brother, Charles, served as a field-artillery officer with the American Expeditionary Forces in Europe during World War I. His father fought Spanish forces in the Philippines while assigned to Company E, 13th Minnesota Volunteer Infantry, during the Spanish American War of 1898.

The end of the Spanish American War brought a period of growth and interest in the Philippines. Among those who cast their future into those Pacific islands was Clark's father. In 1904, Charles Asa Clark moved his family to Manila, where they enjoyed considerable wealth and prestige due to the family's business ventures. During this time, Harold Clark attended the American High School in

Manila; he graduated April 1, 1910.

Clark followed in his family's footsteps and returned to the United States for military training. After being commissioned as a second lieutenant in the cavalry in 1913, his first assignment was with 1st Cavalry Division. In 1916, Clark requested a transfer into the Signal Corps' aviation section, which had been created just two years earlier. Clark's request was approved, and with approval Clark transferred to the North Island Flying School in San Diego, Calif. On May 3, 1917, Clark received his rating as a junior military aviator.

Figure 26. Clark at the North Island Flying School, San Diego, Calif., in 1916 or 1917.

In the spring of 1916, Pancho Villa and a band of followers crossed the U.S. border and raided Columbus, N.M. Soon thereafter, BG John "Blackjack" Pershing was placed in command of the "Punitive Expedition." The Punitive Expedition's mission was to safeguard and protect U.S. citizens and property along the border, as well as capture Villa. In an effort to prove the airplane's military worth, the Army augmented Pershing's forces with air assets. The 1st Aero Squadron was assigned to support Pershing's campaign. Shortly after receiving his junior-military-aviator rating, Clark joined 1st Aero Squadron and flew missions from bases at Columbus, N.M., Kelly Field, Texas, and Fort Sill, Okla.

Aviation in the Hawaiian Islands

While Clark was getting his Army wings, the Signal Corps' aviation section and military aviation in general was getting a troublesome start in the Hawaiian Islands. The first Army airplanes, pilots and crews arrived in Oahu in July 1913. The planes were based at Fort Kamehameha, near present-day Hickam Air Force Base.

LT Harold Geiger, who commanded the aviation assets, arrived in Oahu with "two Curtiss float planes, a Curtiss Aeroplane Company mechanic, 12 enlisted men, canvas hangars and other support equipment," as William Dorrance wrote in ***Fort Kamehameha: the Story of the Harbor Defenses of Pearl Harbor***. However, Geiger's aircraft were in poor shape. His flights were limited to short flights in Pearl Harbor and a longer flight to Diamond Head and back to Fort Kamehameha.

Geiger was ordered to cease all flying operations in late 1913. The planes were sold locally, and the engines were sent back to the North Island Flying School. The Hawaiian Islands wouldn't see any more Army aviation activity until 1917.

On March 13, 1917, 6th Aero Squadron arrived for duty at Fort Kamehameha under the command of CPT John Brooks. However, when the squadron arrived, they did so without airplanes. Brooks was promised two Curtiss N9 seaplanes, but as 1917 wore on the seaplanes hadn't materialized. In August 1917, a frustrated Brooks sent a memorandum to the Army's adjutant general detailing 6th Aero Squadron's activities. The three-page memorandum proposed three recommendations:

- Purchase Ford Island as a joint Army and Navy aviation site;
- Order 6th Aero Squadron back to the United States so it could be used in the war against Germany;
- Assign two more officers to 6th Aero Squadron.

The last recommendation is significant for several reasons. Brooks didn't feel he could safely fly a seaplane if the planes did actually arrive in Oahu. In his memorandum he wrote in detail about the lack of flying time he had while serving in Hawaii. It was Brooks' third recommendation and his complaints about flying time that resulted in Clark becoming 6th Aero Squadron's commander and the Hawaii Department's aviation officer.

Clark arrived at Fort Kamehameha Nov. 14, 1917, with the promised Curtiss N9 seaplanes. He faced the formidable task of learning to fly in the Hawaiian Islands' challenging environment as well as training 6th Aero Squadron's men. Initially he focused his efforts on learning about the islands' prevailing winds and making short local flights over Oahu. Clark's flights were much to the delight of residents, who were frequent spectators to his low-level flights over the cities on Oahu.

Within a few months, Clark was prepared to undertake a mission that would earn him a place in the history of the Hawaiian Islands. On March 15, 1918, he flew to Molokai and back to Fort Kamehemeha; this was the first inter-island flight ever made in the Hawaiian Islands. Upon his return to Fort Kamehameha, Clark was heralded as a hero by military and civilians alike.

The next feat Clark accomplished was a three-island flight. On May 9, 1918, Clark and mechanic SGT Robert Gray took off from Fort Kamehameha. The flight would initially stop in Maui and continue to the island of Hawaii. Upon landing in Maui, Clark and Gray received an enormous welcome from the island's residents. From there, the flight resumed to Hawaii, but Clark

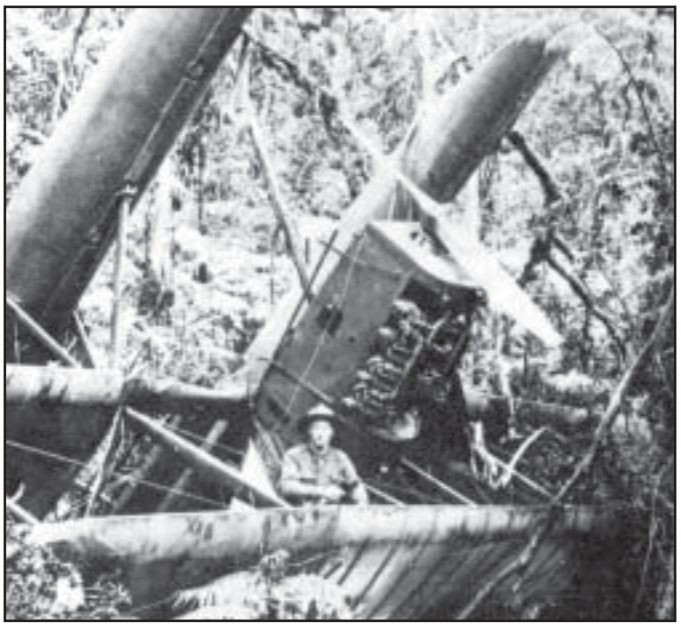


Figure 27. Clark revisits the scene of his crash May 9, 1918, on the island of Hawaii.

encountered fog and darkness over the island, causing him to crash in the jungle near Hilo. Two days after the crash, Clark and Gray emerged from the Hawaiian jungle unhurt.

According to Harold Richards in ***The History of Army Aviation in Hawaii,*** Clark accomplished another "first" on this flight. He had agreed to deliver two letters from Oahu residents to their relatives on Hawaii. After emerging from the jungle, Clark delivered the letters to their intended recipients. Thus Clark carried the first letters by airmail in the Hawaiian Islands.

The fame Clark achieved from these flights is hard to imagine in a day where coast-to-coast jet flights are common. However, in 1918 Hawaii, Clark's accomplishments were just short of miraculous. From accounts at the time, we can get an idea of the recognition paid to Clark. "He was the first aviator to fly regularly in the islands and was more than a hero in the eyes of the natives," Dorrance wrote in ***Fort Kamehameha***. "I remember attending a native luau in his home, and the deference paid him at the time was almost beyond belief."

Fatal crash in Panama

Following the history-making flights in March and May 1918, Clark continued to make regular flights among the islands. However, he was ordered back to the U.S. mainland Aug. 28, 1918, for pursuit training at the North Island Flying School. Following this, Clark assumed command of Pursuit Group, First Provisional Wing, at Minneola, Long Island, N.Y. Clark commanded this group for only a short time before being ordered to Panama at the end of 1918.

Clark arrived at France Field, Panama, in the fall of 1918. France Field was located near present-day Colon. Clark was assigned to the Panama Canal as executive officer for 7th Observation Group.

On the morning of May 2, 1919, Clark and two other aviators, LT J.R.L. Hitt and LT Thomas Cecil Tonkin, left France Field for Balboa in an Army seaplane. While enroute, the plane developed engine problems, but the trio made it to Balboa safely. That same afternoon, the three aviators began the return flight to France Field with Hitt at the controls. Due to the plane's earlier troubles, the flight followed the Panama Canal at an altitude of 250 feet.

Shortly into the flight, the plane's engine stopped. Hitt hoped to make Miraflores Lake to set the heavy seaplane down, but the plane crashed into the front of Miraflores Locks at about 5 p.m. The best account of the crash is taken from the May 3, 1919, ***Panama Star & Herald***: "The machine crumpled up like a house of cards, and the three men were thrown into the water of the lock. Lieutenant Tonkin was undoubtedly killed instantly by the twisting timbers of the machine. …Major Clark sank to the bottom of the lock, and it's not known whether he was killed in the crash or whether he drowned."

Hitt was severely injured in the crash, but bystanders rescued him. The ***Panama Star & Herald*** reported that a diver was sent to retrieve Clark's body. The Army ruled his death as an accident due to internal injuries caused by "aeroplane traumatism," according to a Defense Department report on Clark's death dated May 8, 1919, and awarded his mother $10,000. Clark was buried May 29, 1919, with full military honors at Arlington National Cemetery.

The base that would eventually bear Clark's name was established in 1902 as Fort Stotensberg. The Army used this installation as a cavalry post following the Spanish American War. During World War II, this base would be pivotal in the Army Air Force's effort to win the air war against Japan.

Following the end of World War II and creation of the U.S. Air Force in 1947, Fort Stotensberg was renamed Clark Air Base. In its prime, Clark Air Base was the U.S. military's largest overseas installation at an impressive 156,204 acres. Shortly after its establishment, Clark Air Base would serve as home to 13th Air Force for a number of years. Clark Air Base served the military well during the Korean and Vietnam wars, and it was the first stop of freedom for many returning prisoners of war from Vietnam.

The United States turned over possession of Clark Air Base to the Republic of the Philippines Nov. 26, 1991. Clark Air Base is now an international airport serving the Philippines. Most of the former base's buildings were turned over to private businesses supporting the international airport.

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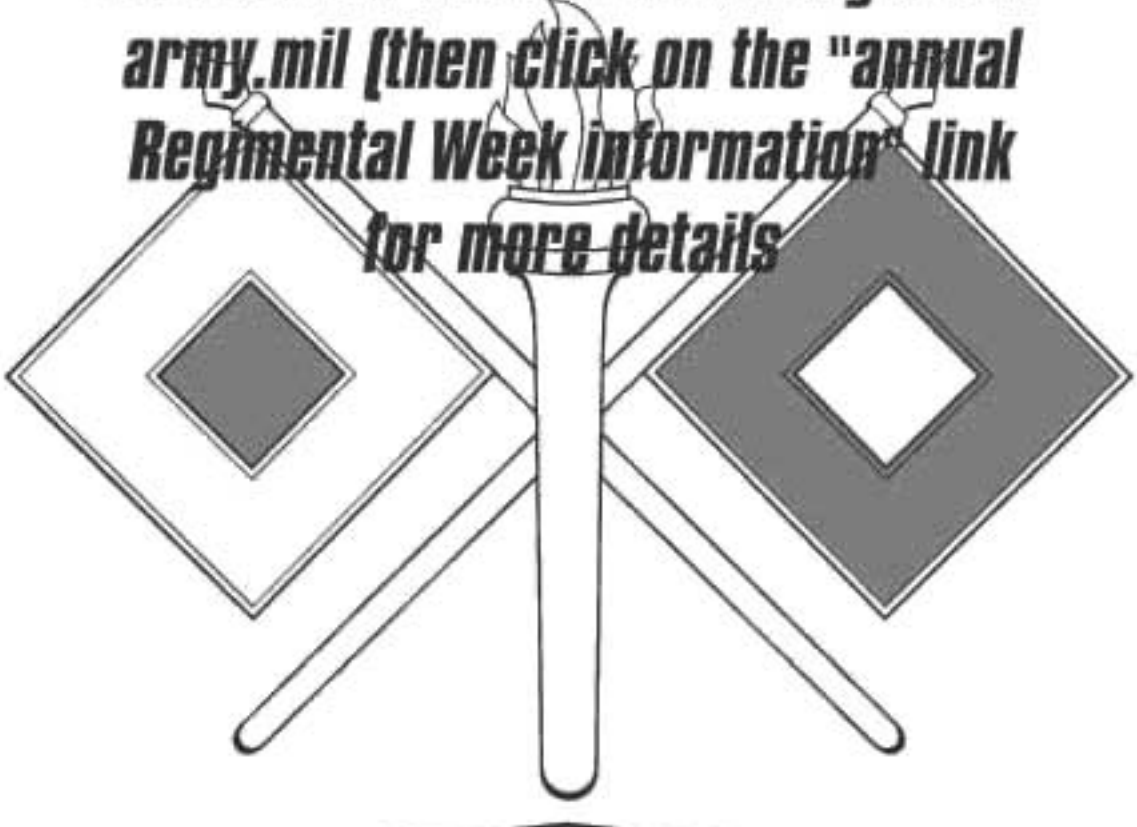

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